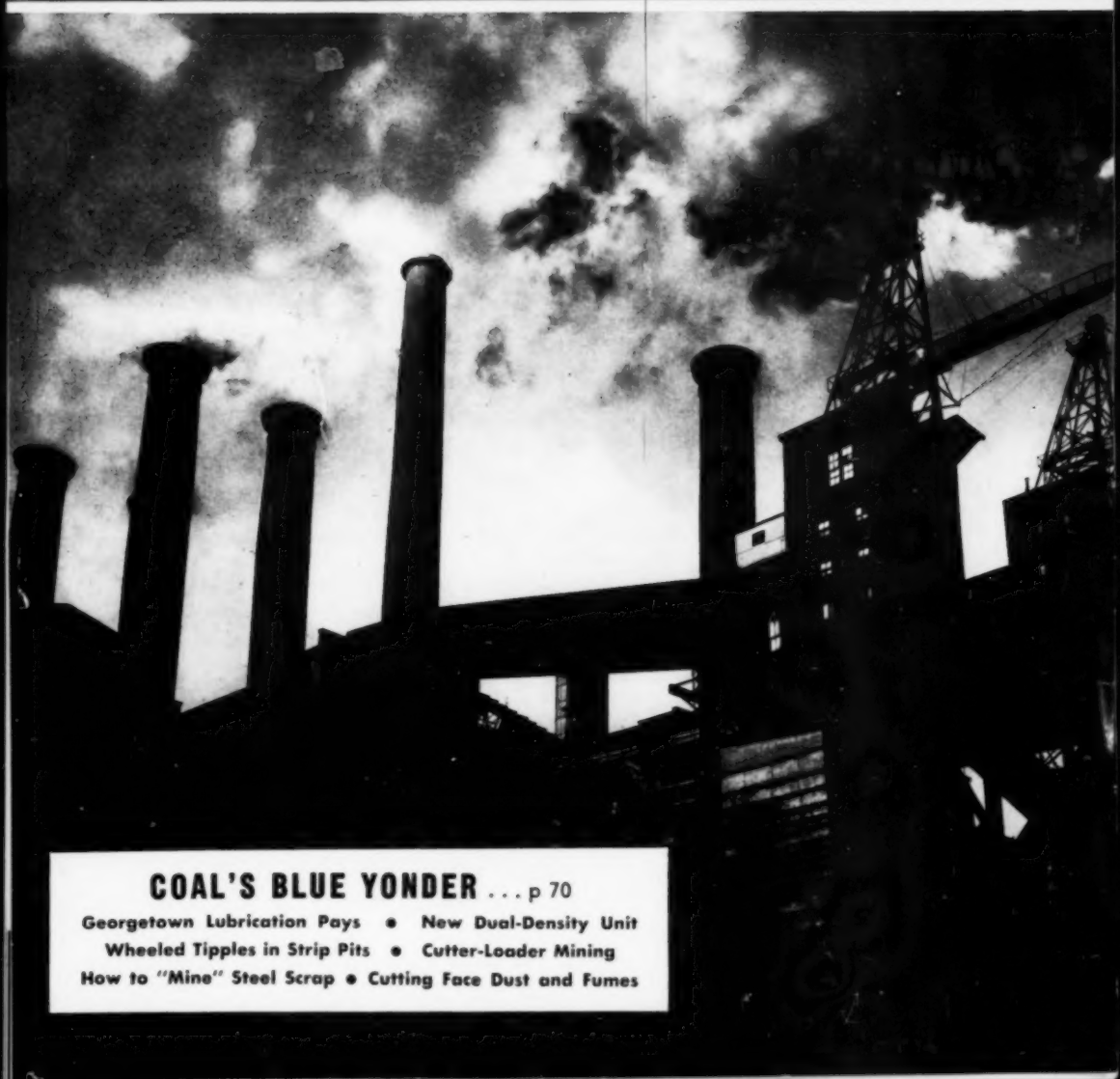
Coal Age

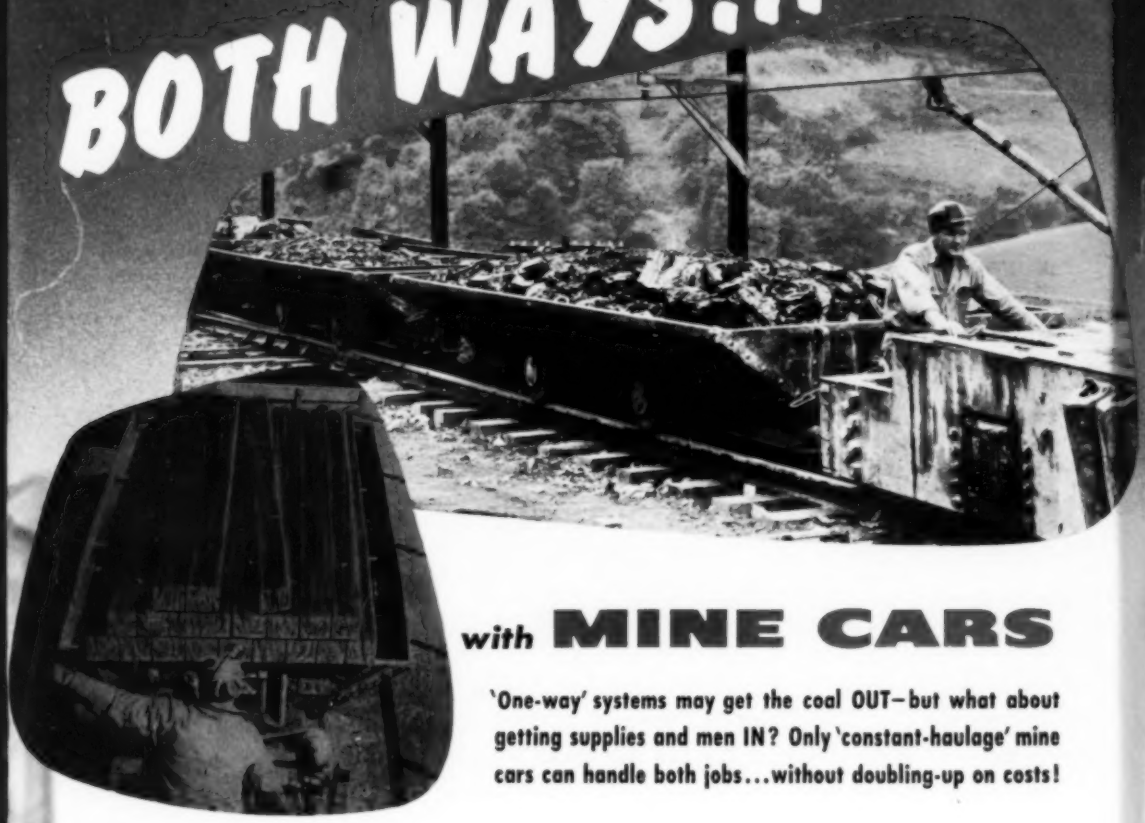
A McGRAW-HILL PUBLICATION—PRICE 50¢ JANUARY, 1952



COAL'S BLUE YONDER ... p 70

Georgetown Lubrication Pays • New Dual-Density Unit
Wheeled Tipples in Strip Pits • Cutter-Loader Mining
How to "Mine" Steel Scrap • Cutting Face Dust and Fumes

YOU GET HAULAGE BOTH WAYS...



with MINE CARS

'One-way' systems may get the coal OUT—but what about getting supplies and men IN? Only 'constant-haulage' mine cars can handle both jobs...without doubling-up on costs!

THERE'S a two-for-the-price-of-one bonus when your main-line haulage system is an all-mine-car system. Timbers, men and supplies move *into* the mine on the same cars that haul coal *out*. You use the same locomotive, the same tracks, the same maintenance crew and equipment. *One* investment for *one* haulage system takes care of *both* jobs!

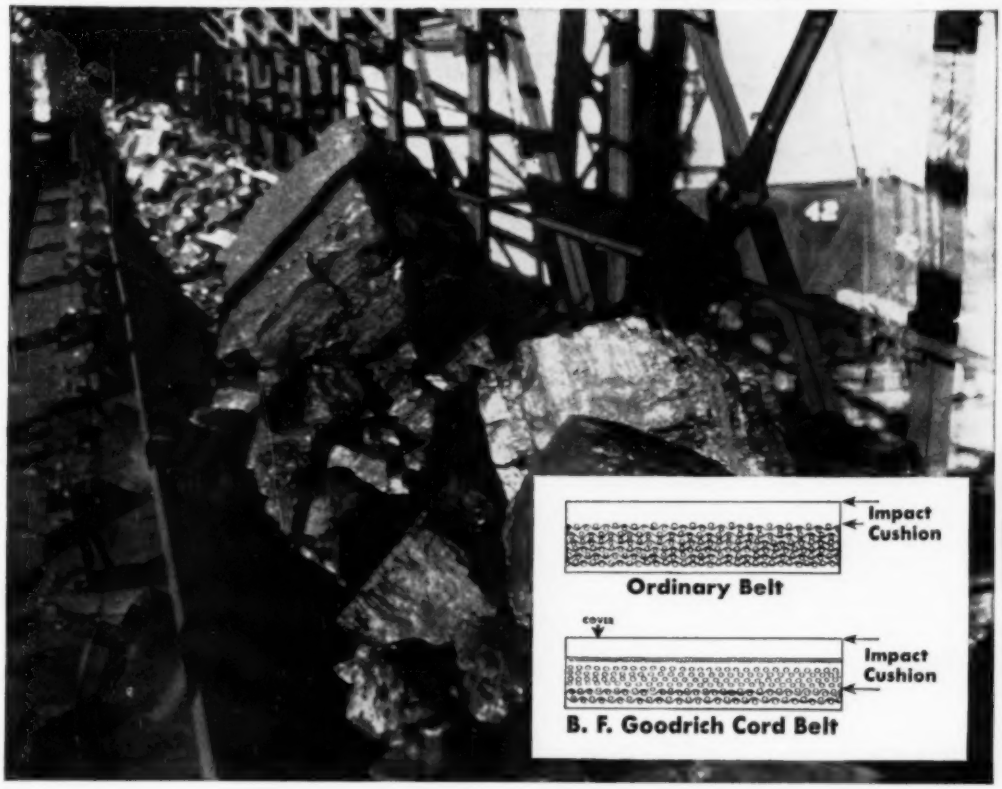
Besides, with mine cars on the main line, repairs don't mean shutdowns. A breakdown—which happens with the best of machinery—doesn't stop your coal from moving. *One* car goes off onto a siding...the rest keep on hauling coal. Most times, the whole thing's handled without slowing down your men and machines *at all!*

If you're planning a new haulage system, let your nearby A.C.F. Representative help you explore the advantages of constant haulage mine cars now. American Car and Foundry Company, New York Chicago · St. Louis · Philadelphia · Washington Cleveland · San Francisco · Huntington, W. Va. Berwick, Pa.

a.c.f. MINE CARS

for Constant Haulage

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER



First B. F. Goodrich cord belt lasted 14 years, carried 16 million tons

THE belt in the picture is the first cord conveyor belt ever installed. Heavy chunks of coal, some weighing a ton a piece, crash out of hopper cars, fall 15 feet, then rough-ride the belt down to river barges. The belt is exposed to sun and ice, Ohio River floods, wet, sharp coal—every possible condition that would ruin other, ordinary belts.

But where the previous belt lasted 5 years, carried 6 million tons, the B. F. Goodrich cord belt went on carrying coal until it reached the record of 16 million tons in 14 years of service. Here are some of the reasons for this impressive service life:

Cord belt stands more impact— Each lengthwise cord in a B. F. Goodrich cord belt is completely surrounded by rubber — no cross threads tie them together. Cords are free to "give" when impact occurs. Rubber distorts temporarily, distributing and absorbing a shock that would damage stiff, unyielding plies. As an extra protection, B. F. Goodrich has added a patented *Transcord Breaker*— an extra layer of parallel cords in rubber, placed across belt width. It acts as a shock absorber, stretches to prevent gouges and cuts from splitting belt cover.

Cord belt troughs better— There being no crossweave in the cord plies, cords are free to flex. Belt conforms to idlers, pulleys. Spillage is reduced, troughing is natural and belt keeps centered on idlers, sustains less damage, requires less maintenance. Longer centers, higher lifts can be used.

On the toughest coal-handling jobs, whether above ground or below, the B. F. Goodrich cord belt designed for coal-handling can do the job better, for less. Your local BFG distributor can show you how this belt can save you money, or write us direct: *The B. F. Goodrich Company, Industrial & General Products Division, Akron, O.*

Conveyor Belts BY
B.F.Goodrich
RUBBER FOR INDUSTRY

NO SIR! YOU CAN'T BEAT THE



Developed about the middle of the 15th Century in Antwerp and Amsterdam the art of splitting diamonds and cutting regular facets into these hardest of all gems is still brought to perfection only by human skill. You can't beat the expert at his specialty.



HULBURT OIL & GREASE COMPANY

Specialists in Coal Mine Lubrication

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TAKE COAL MINE LUBRICATION—FOR INSTANCE

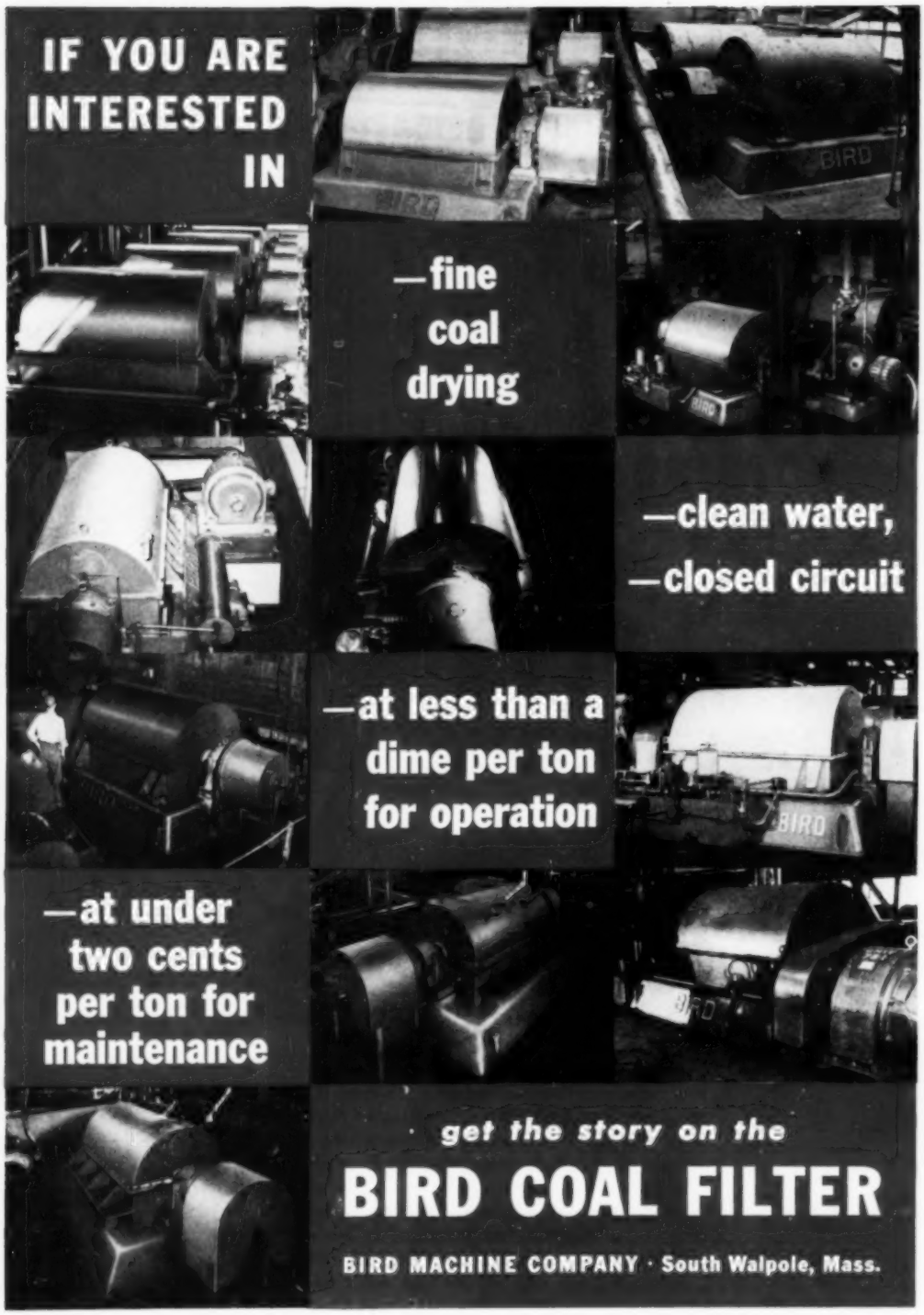
THAT'S WHY NOTHING CAN BEAT



Hulburt Quality GREASE

"The Champion"

It's "diamond-cut-diamond" when it comes to a lubricant to meet the special conditions of fighting friction down in coal mines. For these conditions are unlike anything elsewhere in industry, and require a lubricant to match. Hulburt Quality Grease meets these extra hard conditions to perfection because it is a specialized lubricant, made ONLY for RIGHT lubrication under coal mine conditions. There's no lubricant for coal mine machinery like Hulburt Grease—a "brilliant" success at cutting costs and breakdowns.


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—at less than a dime per ton for operation
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Coal Age

JANUARY • 1952



ELECTRIC UTILITIES, typified by this plant of the Consolidated Edison Co. of New York, may soon be coal's biggest customer. In the 11 yr to 1950, the utilities' coal consumption jumped 90%, to an annual rate of 88 million tons—and is expected to go to 110 million tons in 1952. All in all, coal looks good in 1952, and for years to come, as you'll gather from this month's lead-off feature starting on page 70. Despite its optimistic note, "Coal's Blue Yonder" is based on solid facts, and you'll find this *Coal Age* staff-prepared analysis interesting and informative.

LOOK AHEAD TO FEBRUARY

. . . for a helpful round-up of what 1951 developments meant to the coal industry, and to you as an operating man. The comprehensive staff-written summaries are carefully prepared to save you reading time while highlighting important progress and trends.

1951—Solid Year for Coal—The picture on labor, public and government relations, market demand, economics and research. What the coming year looks like.

Mechanical Mining Booms—New methods and new machines made coal a better industry in 1951. What they were and what they proved, with a studied glimpse ahead.

Loader and Cleaner Sales and Safety Progress — The official USBM studies rushed into type for your information.

. . . Plus, of course, the usual fare of helpful mine-operating articles and "working" departments that put *Coal Age* on your reading list month after month.

Editorials: New Contender; How Far? 69

Coal's Blue Yonder 70
Here's why coal demand looks good in 1952, and for a long time beyond.

Making Lubrication Pay 76
Hanna Coal's $120,000 savings are only part of Georgetown gains.

Find Scrap—Get More Steel 88
Mining scrap will pay off for you, as Valley Camp found out.

Dual-Density Cleaning—H. J. DANIELS and HAROLD DAVIS. . . . 90
How new-type unit gets near-perfect results with difficult anthracite.

Mining With the Cutter-Loader—M. C. POTTS 94
British unit, soon to be tried in U. S., boosts mining efficiency.

Oiler on Headsheave Halves Rope Cost 103
Adding a mine-made drip oiler doubled wire-rope life for hard digging.

Plastic Pipe Makes Better Borehole Lining 103
How an 180-ft borehole was lined with non-corrosive pipe in 5 hr.

Mobile Preparation Plants Serve Modern Strippings . . 104
Modern equipment and methods lick problems in Northeastern Ohio.

Dust and Fume Control—L. H. MCGUIRE 108
Fog guns and multiple shooting prove highly effective underground.

Foremen's Forum: What It Takes to Be a Leader 112

Peabody Repairmen Lengthen Loading-Machine Service 126

Modernized British Colliery Features 500-tph Loading Station . . . and Photoelectric Haulage Signalling 128

How to Get More Service From Your Shovels— A. E. YORK 131

Equipment News and Bulletins . . . 118 News Round-Up 135

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Lubricate ball or roller bearings in mine locomotives, cutters, loaders and other equipment with *Texaco Regal Starfak*. This premium-quality lubricant outperforms ordinary greases . . . keeps balls and rollers fully protected against wear and rust. *Texaco Regal Starfak* stays in the bearings longer. You save on maintenance.

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TUNE IN . . . TEXACO STAR THEATER starring MILTON BERLE on television every Tuesday night. METROPOLITAN OPERA broadcasts every Saturday afternoon.

TEXACO

TEXACO LUBRICANTS



Photo courtesy Goodman Mfg. Co.

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The lubricant to keep wire rope strong longer and to prolong the life of open gears is *Texaco Crater*. On wire rope, it penetrates, protects both strands and core. On gears, it reduces wear and muffles noise. For extra convenience in application, use *Texaco Crater X Fluid*. It *goes* on as a liquid, *stays* on as a tough, long-lasting protective coating.

A Texaco Lubrication Engineer will gladly show you how Texaco Lubricants can cut costs throughout your mine. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

For the Coal Mining Industry

Faithfully yours 50 *for Fifty Years*

NOW! a Great New HEAVY-DUTY GRADER

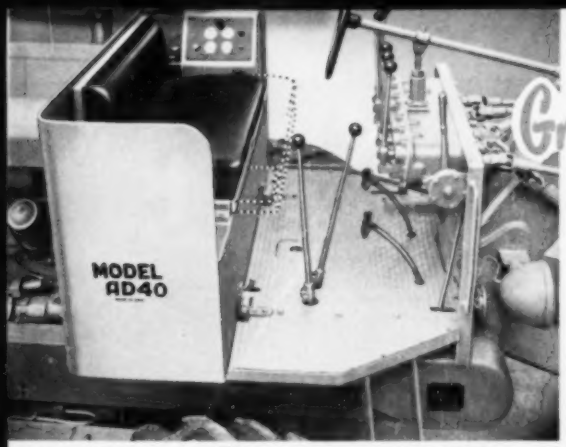
Allis-Chalmers AD-40

Weight—23,000 lb.
(24,800 lb. with optional calcium chloride in tires)

104 Brake hp.

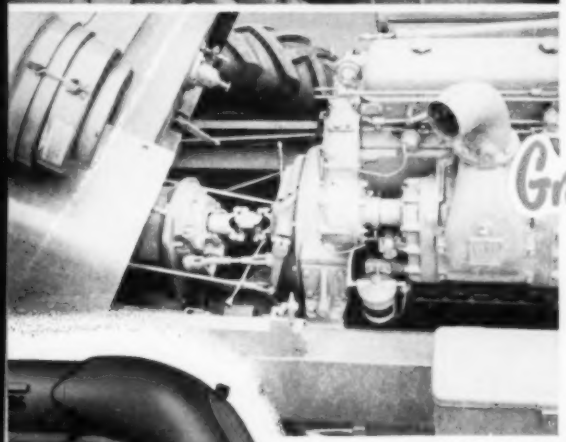


Built to handle All Jobs —FASTER, EASIER



Great New operating ease

No other grader has been designed with the operator more in mind. **Unmatched Visibility**—Single tubular frame from front to platform, new lift cases, low control box and tapered platform give operator a full view of what he is doing. **Feather-Touch Steering**—New hydraulic booster system, fully enclosed in the frame, provides effortless steering with positive control even under toughest conditions. **All-Around Comfort**—Roomy platform, adjustable seat (as shown) and simple controls offer any size operator true comfort—sitting or standing.



Great New service simplicity

Here's maintenance and repair accessibility second to none. Combined fuel tank and seat unit tilts forward for easy access to clutch, transmission and drive shaft. Transmission can be removed without disturbing floor plates. Power take-off and hydraulic pump are mounted outside the dash.



Great New performance

Add these outstanding operator and service advantages to the exclusive Allis-Chalmers features that include ROLL-AWAY* Moldboard—extra high clearances from front to rear—shock-absorbing tubular frame—dependable General Motors 2-Cycle diesel power . . . and you have the finest heavy-duty grader on the market. Get the full story on this new AD-40 from your Allis-Chalmers dealer now.

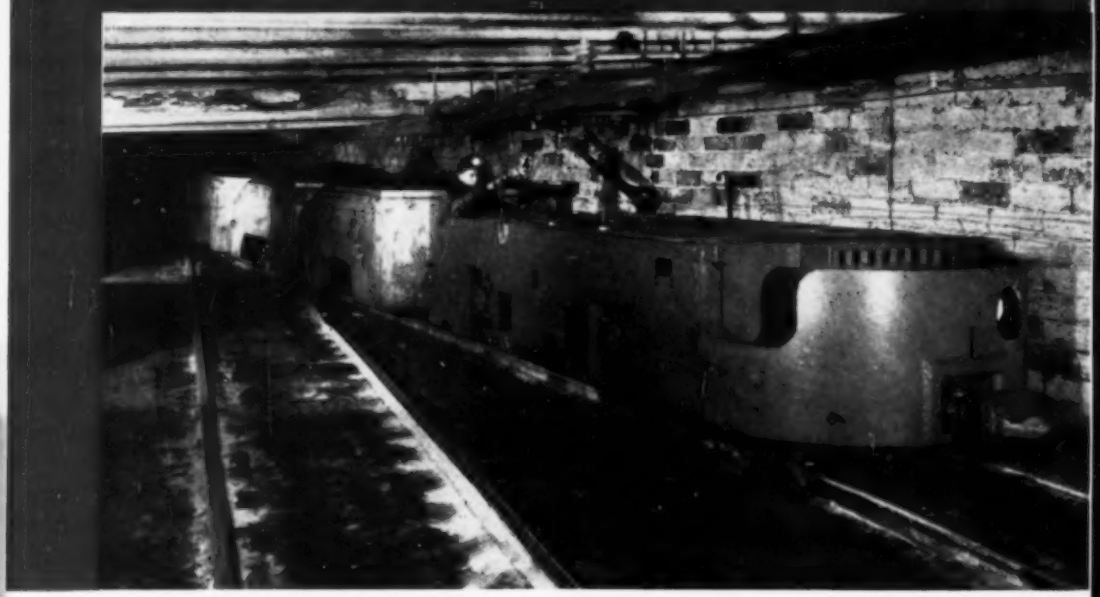
*ROLL-AWAY is an Allis-Chalmers Trade-mark.

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● From the days of hand loading direct into small mine cars Jeffrey Locomotives have been in constant use as power units under widely divergent conditions.

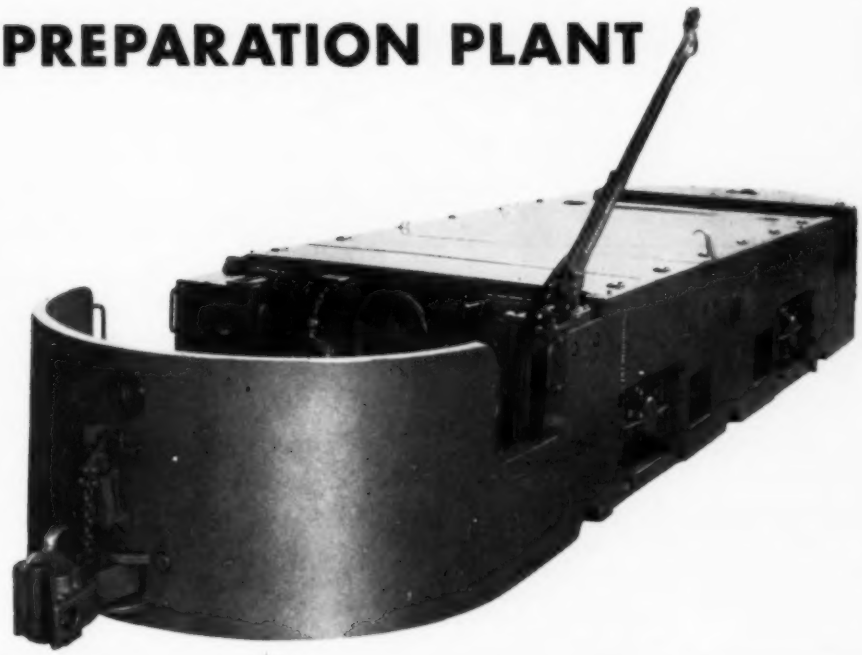
Today wherever coal haulage is maintained by rail Jeffrey provides modern locomotives to meet every haulage condition.

Jeffrey Locomotives are available for main and gathering service in all types—battery—cable reel—trolley and in various combinations to fit your operation. They can be single units or tandem —four wheel drive or the new eight-wheel, high speed units.

Consult a Jeffrey Engineer on your transportation system for greater production and lower per ton costs.

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DEPENDABLE HAULAGE FROM FACE TO PREPARATION PLANT



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Complete line of Material Handling, Processing and Mining Equipment

In 6 months 1000 hours of



FAST DUMP... body raises at touch of electric switch . . . streamlined bowl clears loads instantly.

Hauling sandstone and gravel in tight quarters, 2 C Tournarockers speed tough haul jobs for Fred Onuparik

At New Haven, Connecticut, Fred Onuparik Construction Company tackled a difficult hauling problem. The job involved moving 70,000 cubic yards of sandstone from a short 1700′ stretch to relocate heavily-traveled U. S. 1 around the city's business district. Both loading and dumping areas were narrow and restricted . . . haul roads, rocky and rough. Mobile, high-speed, off-road haulers were needed for lowest cost operation . . . Onuparik's LeTourneau Distributor had the answer . . . 2 rear-dump, 16-ton C Tournarockers.

Teamed with a 1¼-yd. shovel and working 2000′ cycles, the 2 big, rubber-tired "C's" delivered up to 1200 cubic yards of heavy shot rock per day. Each 16-ton rig took 8 to 10 passes from the well-heaped dipper . . . carried 10 pay yards per load. "We're very well pleased with this performance," reports Owner Fred Onuparik, who later used his 2 LeTourneau rear-dump haulers on a 55,000-yd. relocation of Connecticut State Rt. 109 between Thomaston and Watertown.

Handling mostly rock and gravel, Onuparik's rigs worked approximately 1000 hours on these 2 jobs, with a mechanical operating efficiency of 98%. Both 165 h.p. "C's" were driven job-to-job under their own power . . . completing the 45-mile trip from New Haven to Thomaston through very heavy main highway traffic in 3 hours.

Ability to maintain high standards of output and mechanical efficiency under all job conditions is the reason why progressive mine and quarry operators are turning to rear-dump Tournarockers for low-cost hauling of rock, gravel, ore, and other materials. Your LeTourneau Distributor will be glad to show you job-proved facts and production figures on new 18-ton "C's", as well as on 9, 35, and 50-ton Tournarockers. Call him, or write TODAY.

LETOURNEAU PEORIA ILLINOIS **TOURNAROCKERS**

operation...98% efficient



BIG TARGET...Tournarocker's 12' x 8' top opening speeds shovel loading . . . reduces spillage.



Job No. 1 Cutting 70,000-yd. by-pass for U. S. 1 around New Haven business district, each of these 35 m.p.h. C Tournarockers hauled 600 pay yds. of sandstone per day on 2000' cycles. Entire job was only 1700' long, with all excavation made at this end of the area.



Job No. 2 To relocate Rt. 109 near Watertown, Tournarockers moved 40,000 yds. of rock and 15,000 yds. of gravel on very short hauls (average, 500 ft., one-way). "They're the best hauling units I've seen for limited working areas," says Master Mechanic Phil Onuparik.

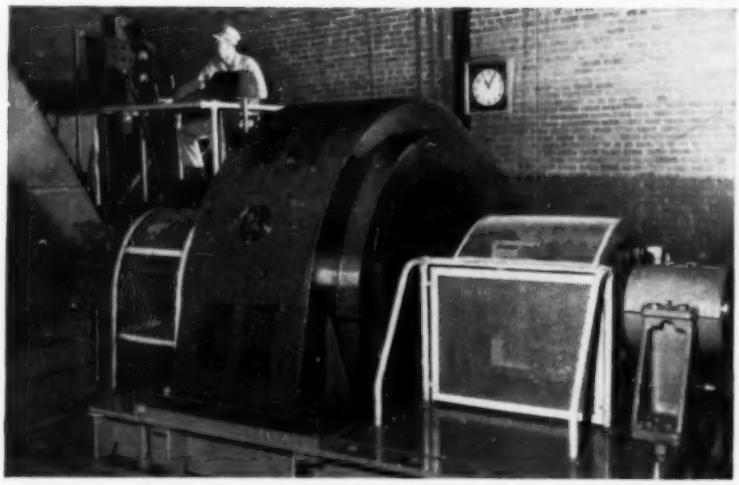
HIGH SPEED on RUBBER PLUS TRACTION ADVANTAGES of a CRAWLER

LeTOURNEAU LET EQUIPMENT

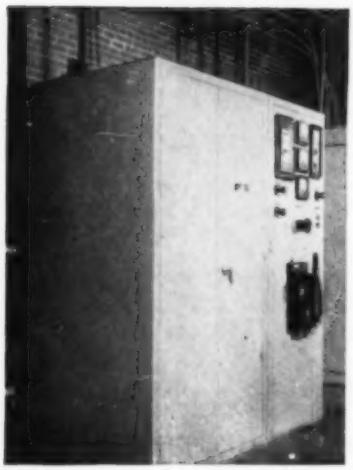
Mine output gets a lift with G-E hoist drives

265-foot shaft...

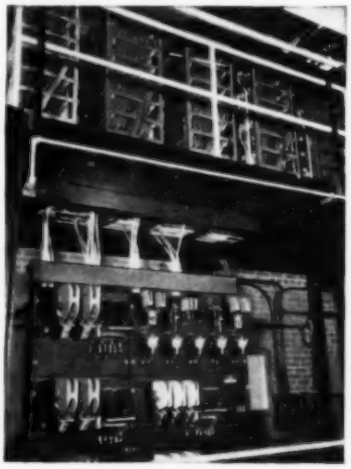
450 trips per day!



In this Pennsylvania coal mine the coal hoist averages 450 trips every 24 hours, working two eight-hour shifts a day. Its G-E a-c hoist drive helps maintain output because it provides high service continuity, needs only minimum maintenance. Shown here is the G-E 500-hp 2200-volt induction motor driving the hoist.



This G-E metal-enclosed primary control panel in the same mine incorporates the line circuit breaker, providing emergency disconnecting, and the primary reversing contactors. Completely wired and factory-assembled for quick, easy installation, this packaged unit includes everything needed.

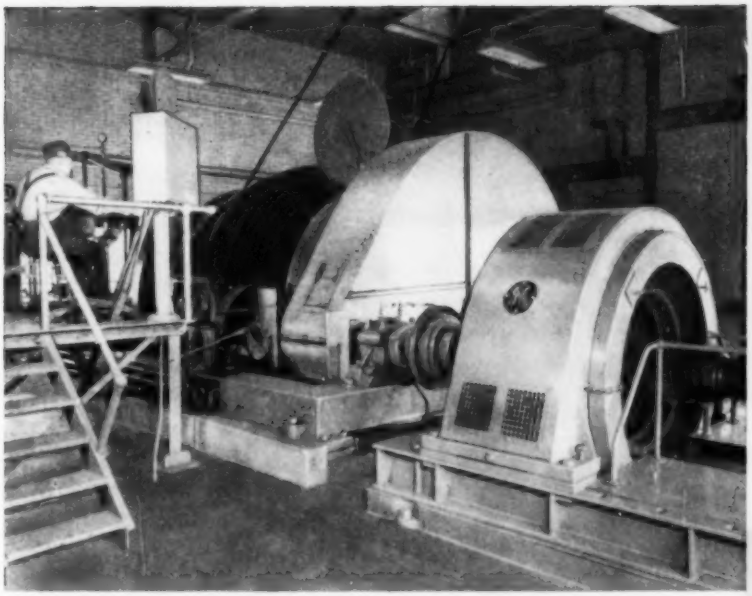


G-E secondary control, shown at right, includes secondary resistors and accelerating contactors, enabling the operator to properly accelerate and decelerate the hoist motor with the master switch.

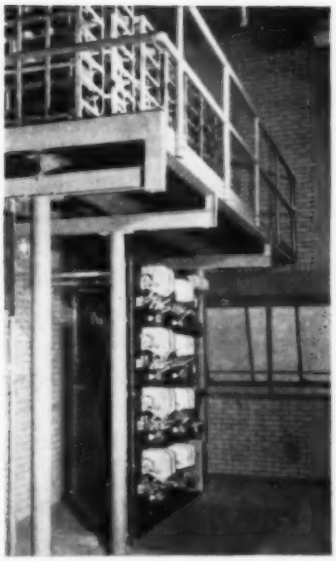
GENERAL ELECTRIC

500-foot shaft...

888 trips per day!



In this large West Virginia coal mine, a G-E equipped coal hoist was recently installed to increase output. Hoisting 7100 tons of coal plus 1000 tons of slate mined per day, it makes 888 trips per 14½-hour day up a 500-foot shaft. The G-E 800-hp 2200-volt a-c hoist motor shown here is giving top day-in-day-out service.



Secondary resistors for this hoist are balcony-mounted above the secondary control, providing a space-saving, out-of-the-way installation. Primary control panel (not shown) was also supplied by G-E.

To improve power factor in the mine, this G-E metal-enclosed Pyranol* capacitor equipment—rated 540 kvar, 2400/4160 volts—was also installed. G-E capacitors reduce power costs, release system capacity, improve voltage levels and cut power losses. With no moving parts, they need practically no maintenance.

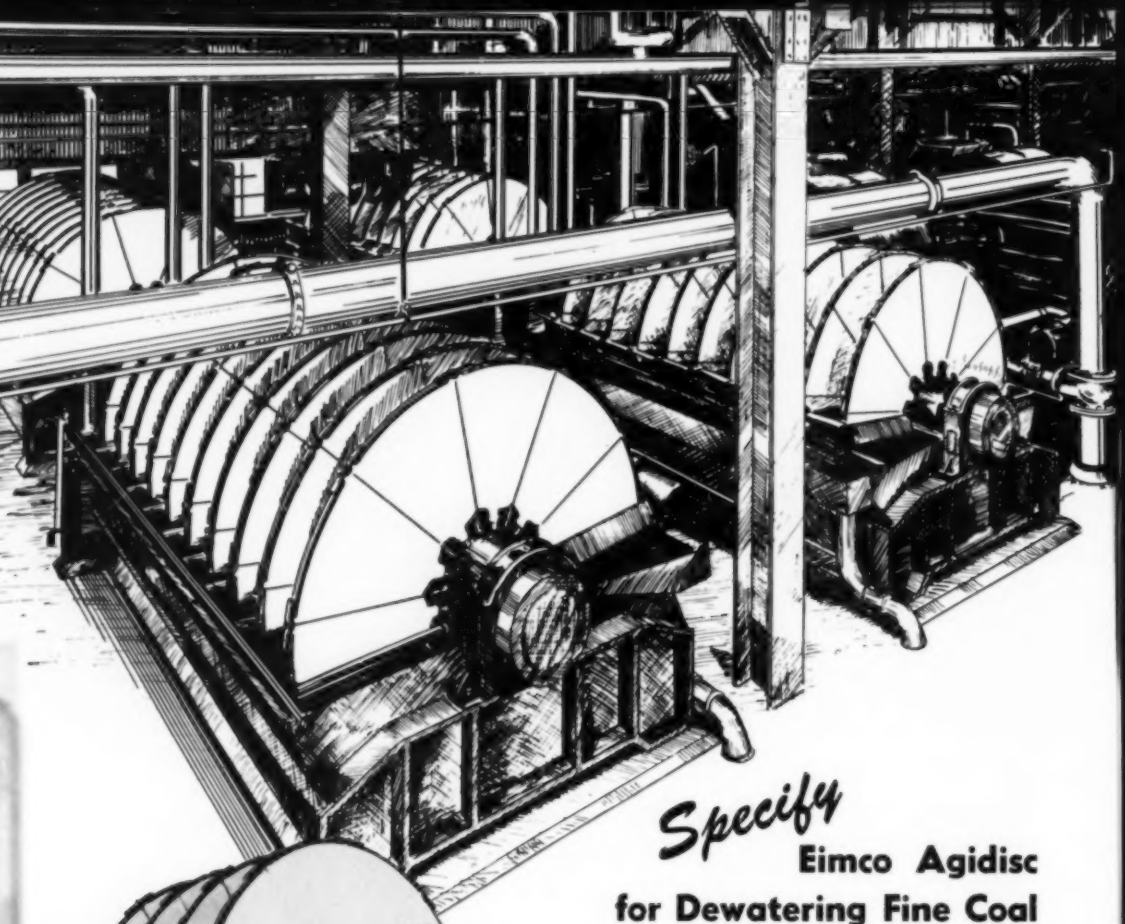
*Reg. trademark of General Electric Company

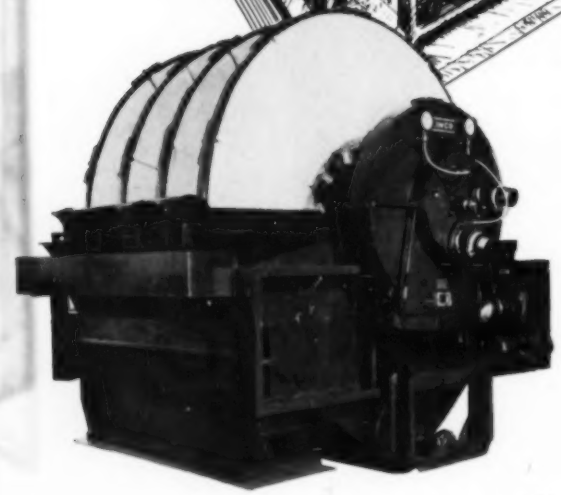


Mine-Hoist Drives

. . . to cut mining costs!

These are only two of over 900 G-E large mine-hoist drives now in service, helping to raise mine output and lower hoisting costs. For skilled help on your mine-hoist drive—whether it's a-c or d-c—call a G-E mining specialist at your nearest G-E office. *General Electric Company, Schenectady 5, N. Y.*





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The Eimco Agidisc combines the advantages of large filter area and small floor space (as on conventional disc type units) with the added feature of efficient agitation in the vat. This provides uniform cake distribution over the entire disc area with a resulting lower moisture content in the cake, even and faster drying over the entire surface, clearer filtrate and greater tonnage capacity per shift.

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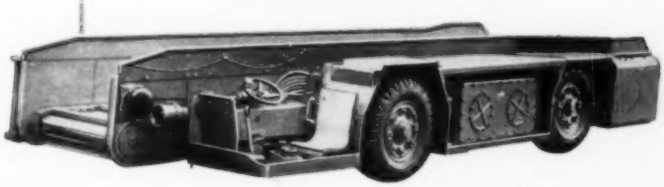
Cold Facts about Securityflex

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when you compare shovels and cranes





How "Cat" DW10s helped Wyodak step up production!

This is the Wyodak Coal Company's mine near Gillette, Wyoming. The vein's from 40 to 90 ft. thick—and stripping overburden is no cinch, because you've got to contend with the toughest kind of gumbo. Hoping to step up the operation, Wyodak switched from other earthmoving equipment to an all "Caterpillar" lineup. They already had the "Cat" D8 Tractor with No. 8S "Dozer—they added two "Cat" DW10 Tractors with No. 10 Scrapers.

Working a seven-hour day with the D8 push-loading, the two DW10s averaged 75 loads each on a half-mile haul. Production per load averaged 13 pay yards—a total of 1,950 pay yards per day. And remember, that's handling wet, sticky gumbo. "These rigs are living up to 'Caterpillar's' recommendations," Wyodak men say. "They're performing very satisfactorily with a minimum of running repairs."

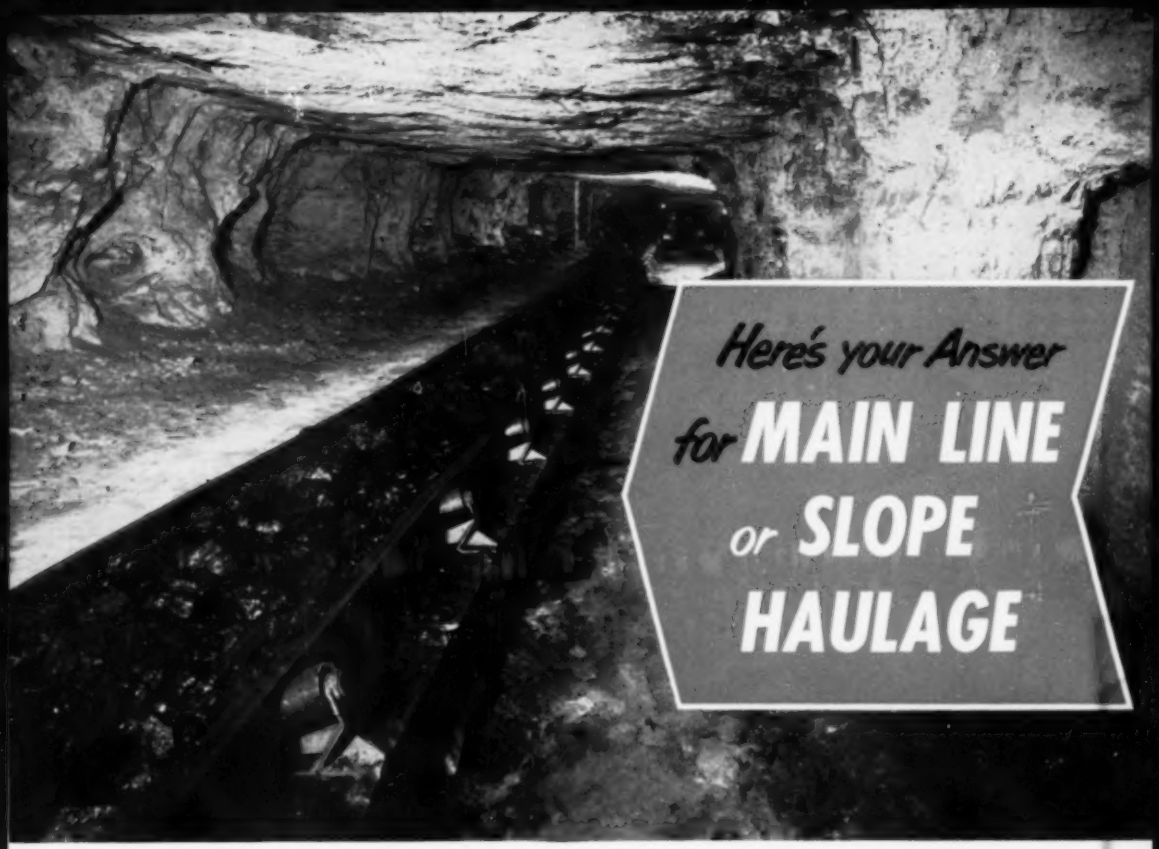
Increased production is important these days—and "Caterpillar" machines are built to stand up under heavy demands. Of course, with good care they'll give you longer life. The defense effort demands that they wear longer. So keep them in good shape—have your "Caterpillar" Dealer recondition parts before they become unusable. By taking your service problems to him, you'll get many extra working hours from "Caterpillar" equipment.

CATERPILLAR, PEORIA, ILLINOIS

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT



JOY BELT CONVEYORS

Complete Range from 26" to 48", featuring:

Heavy, rugged construction for Main Line or Slope work . . . Field-proved dependability and low maintenance . . . Special "knockdown" frame design for easy portability in low coal.

For maximum reliability in the vital job of main line or slope haulage, JOY Belt Conveyors are your proved best bet. They employ heavy, pan-type sections, bolted together for extreme rigidity and available in 8′, 9′, 10′ or 12′ lengths—with various idler spacings depending upon the requirements of the job, and with 4″, 5″ or 6″ dia. rolls. The idler rolls are available either with heavy duty, sealed-for-life ball bearings, requiring no attention, or with heavy duty, grease-type tapered roller bearings, as desired. ● For *any* mine conveyor need—belt, chain or shaker—let us show you how a JOY unit will do the job best, and at lowest overall cost per ton.

Consult a Joy Engineer

W & D CL 3980



JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

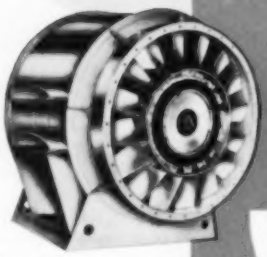
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

JOY

AXIVANE* MINE FANS

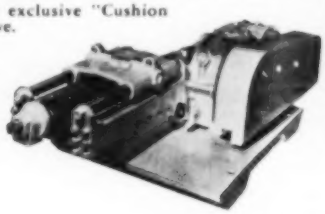
Vaneaxial-type fans for all main ventilation requirements—also Portable Blowers for auxiliary ventilation.

*Reg. U.S. Pat. Off.



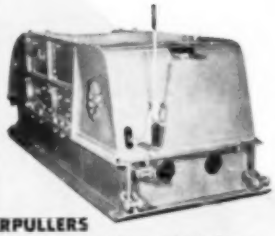
SHAKER CONVEYORS

Below, the exclusive "Cushion Stroke" drive.



CONTINUOUS MINERS

Models for high and low coal.





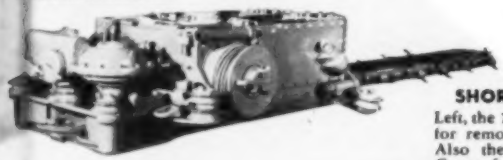
MOBILE COAL CUTTERS

Above, the 12-RB Cutter, designed for very low coal. Other trackless units include the 10-RU and 11-RU Universal Cutters.

CARPULLERS

Other utility equipment includes a Caterpuller, Pulldozer, Timber Setter, Material Trucks, etc.





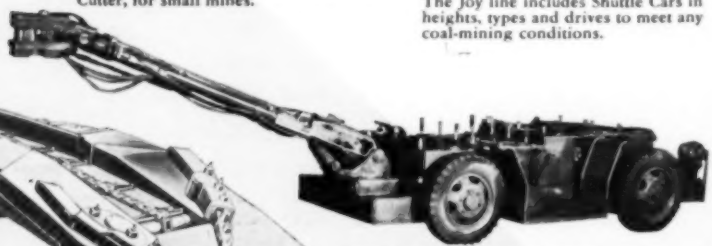
SHORTWALL COAL CUTTERS

Left, the 11-B Cutter, with Joy Bugduster for removal of cuttings from the kerf. Also the 7-B Heavy Duty, and 5-B1 Cutter, for small mines.

LOW VEIN SHUTTLE CARS

Above, the 8-SC Shuttle Car, only 26" high for use in very low coal. The Joy line includes Shuttle Cars in heights, types and drives to meet any coal-mining conditions.





MECHANICAL LOADERS

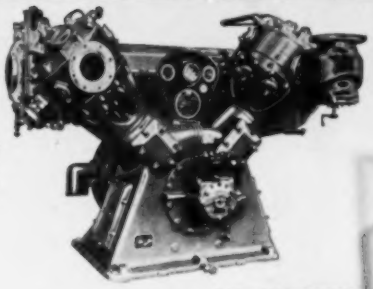
Above, the 20-BU, a high-capacity Loader only 24" in height for very low coal. Other Joy Loaders to meet any need.

HYDRAULIC ROOF-BOLTING DRILL

Above, the RBD-1, fastest drilling machine built for roof bolting. Joy also builds a complete line of hydraulic Coal Drills, single and twin boom.

...Your Complete Source of Mechanized Mining Equipment

FIELD-PROVED to Give You Greatest Production Increases and Cost Reductions

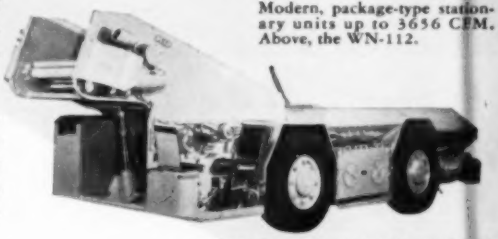


AIR COMPRESSORS

Modern, package-type stationary units up to 3656 CFM. Above, the WN-112.

JOY Mechanized Mining Equipment is the result of years of pioneering research, development and on-the-job engineering. It is the world's most complete line of modern mining machinery, built by the world's largest manufacturer in the field.

These facts have real importance for you because they give you positive assurance of equipment that can stand the gaff, stay on the job and operate with the sustained high efficiency that means greater tonnage and lower costs. Whatever your requirements or seam conditions may be, in soft coal or hard, there's a field-proved JOY unit to do the job *best.* ● Let us work with you.



HIGH-CAPACITY SHUTTLE CARS

Above, the 10-SC—a rugged, heavy-duty Shuttle Car that can handle coal and rock in full seam mining.

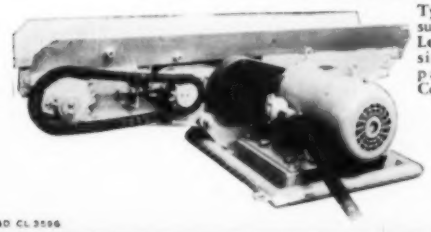
PERMISSIBLE MINE-AIR COMPRESSORS

B. of M. approved. Self-propelled (the WK-83, right) or draw-bar models, up to 240 CFM.



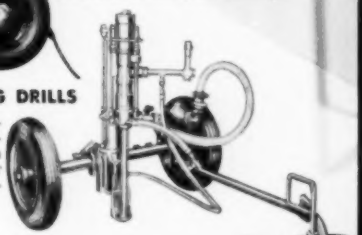
BELT and CHAIN CONVEYORS

Types and sizes to suit any conditions. Left, the new, light, simple and compact FA Chain Conveyor.



ROOF-BOLTING DRILLS

Right, the highly-mobile, fast-drilling SAW Wagon Stoper. Other drills for any roof-bolting need.



Consult a Joy Engineer



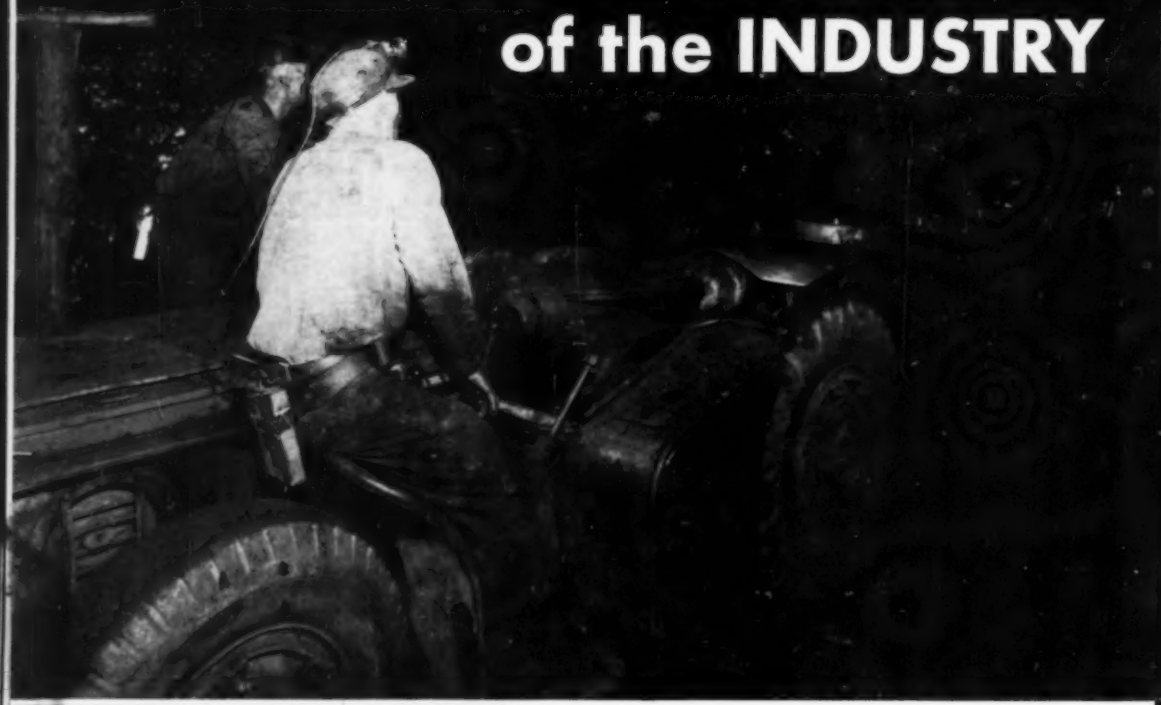
WAD CL 3596

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

The ACCEPTED STANDARD of the INDUSTRY



JOY 10-RU CUTTER

Field-Proved TIME-AND-AGAIN for Dependability!

In the medium to thick-seam mechanized mines, the JOY 10-RU Universal is by far the world's most widely used and preferred coal cutter. Unlike other mobile cutters, the 10-RU has the hydraulic power and rugged construction necessary to permit "humping" the machine on the bar, so that a square face can be cut in any width room. It is a highly maneuverable and flexible machine, fast tramming and fast cutting, able to stay ahead of any loader. The 10-RU can top or bottom-cut, slab or shear-cut at will, and with minimum time required for positioning. It has the powerful cutting action needed to handle impurities, and is ideal for split-seam mining. ● JOY Coal Cutters include a complete line to fit any mining methods or height of seam, and reduce your cutting costs. *Let us work with you.*

Consult a Joy Engineer

W & D EL 3982



JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

THE SPOTLIGHT'S ON...

THE "BIG THREE"

3 OF THE FINEST COAL CUTTING BITS EVER OFFERED

For years, "CINCINNATI MINE" has occupied the spotlight in the design and production of improved cutter chains and bits. First came the famous reversible, double-edged DUPLEX BIT... then the smaller but similar STANEX BIT... and now the best in carbide tipped bits... the new CINCINNATI CINIDE BIT.

THE PRIDE OF THEM ALL...

CINCINNATI DUPLEX BIT



The reversible DUPLEX BIT as well as DUPLEX TIPPED BIT, available in various grades to meet all cutting conditions and made of high-quality alloy tool steel with keen cutting edges is the ultimate in design and low-cost efficient performance. Bits are quickly and securely set... cut more tons of coal per shift... give coarser cuttings... reduce power consumption and maintenance cost on mining machines.

THE STANEX BIT



A SMALLER BUT WORTHY COMPANION OF THE WORLD-FAMOUS DUPLEX BIT

Where cutting conditions are not too severe, the STANEX BIT along with the Stanex Bit Holder and the Stanex Cradle is designed to give you some of the advantages of the DUPLEX BIT... advantages such as modern, reversible, factory heat-treated bits in mines using ½" x 1" bit cutter chains. Light in weight, the STANEX BIT is particularly popular in thin seam conveyor mining where transportation is a problem.

The

CINCINNATI

MINE MACHINERY CO.

CINCINNATI 25, OHIO

THE *NEW* CINIDE BIT



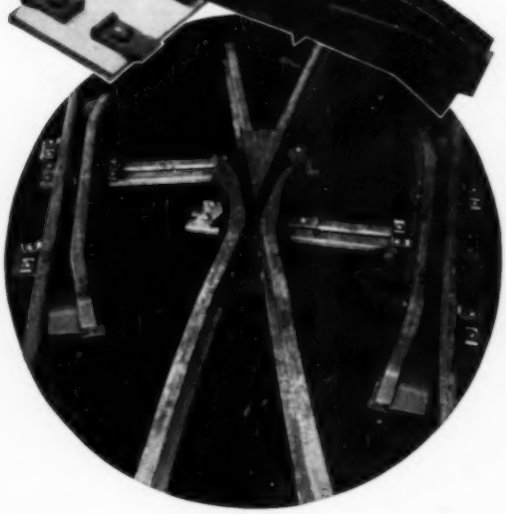
The CINCINNATI CINIDE BIT, now available for use in chains accommodating ½" x 1" bits, combines the abrasion resistance of tungsten carbide with the strength of forged shanks of heat treated alloy steel. Shanks are selectively hardened to give greater resistance to bending plus maximum support for the cemented carbide tip. Front portion of shank remains tough but not so hard as to prevent adequate set screw penetration to insure positively-held bit. Made in various combinations of bit gauge and shape. Write for catalog sheet.

Off in a jiffy!

On in a jiffy!

Bethlehem's Detachable Guard Rail

for use with steel frog ties



Bethlehem 745-S guard rail. All clips are held in place by thick, heavy rivets. The two inside clips are stationary. The four outside clips rotate; simply strike them with a hammer until they swing around over the base of the running rail. A good tight fit always results.

You've never seen a guard rail that's as quickly and easily installed as this one. It's Bethlehem's design 745-S, and attaching or removing it is mere child's play.

All you do is slide the base plates under the running rail until the riveted stationary clips fit snugly over the rail base; then tap the outside rotating clips into place with a hammer. There's your guard rail, sturdy and tight and shock-resisting. The method of installation is, in principle, the same as that used with Bethlehem steel mine ties.

Another big advantage: the need for chocks is eliminated. There are no holes to be drilled in the stock rail; no bolts to insert, no nuts to run up.

The 745-S is available in several different lengths and is made for use with any weight of rail from 30 lb to 60 lb inclusive. It's built to withstand heavy thrust and shock when used with steel frog ties as we recommend; and it's ideal for service with prefabricated track. For full details—or an actual demonstration—call the nearest Bethlehem man.

This partial track assembly shows two 745-S guard rails, two Bethlehem frog ties, and a Design 289 frog. Weight of rail, 30 lb. Note how the clip arrangement on the frog ties helps give added stiffness to the guard rail assembly.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

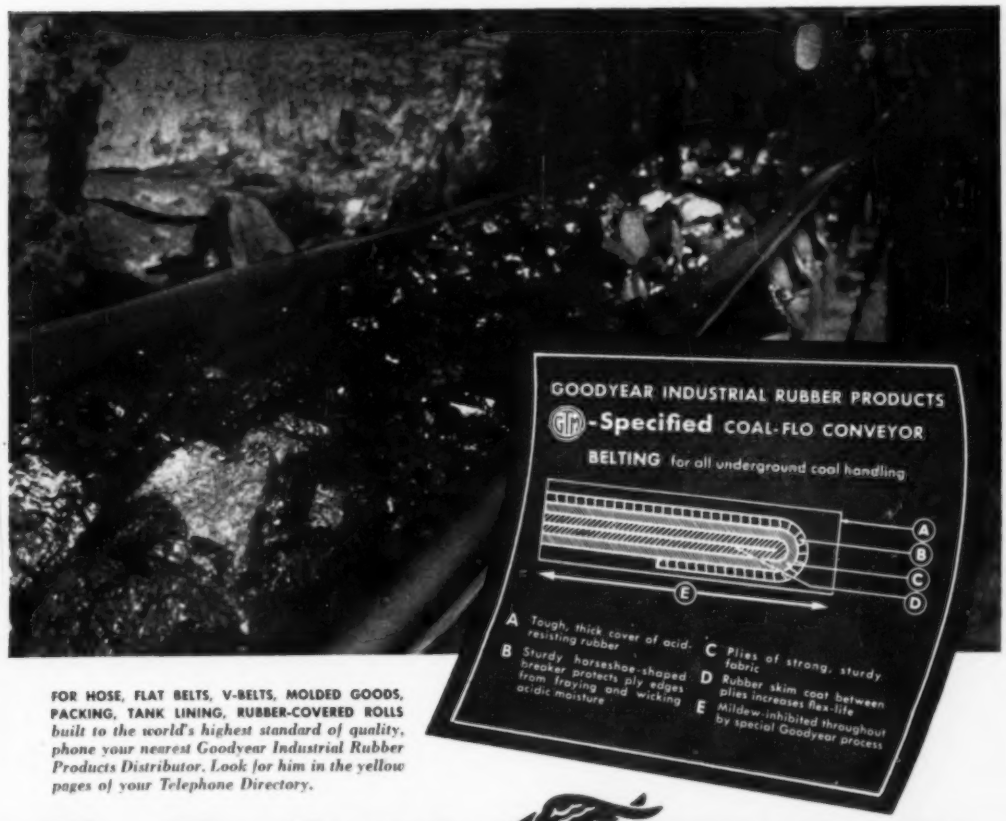
★ BETHLEHEM STEEL ★

Under water 9 months

–this belt is still in service!

The mine you see here was flooded to douse a below-ground fire — then pumped dry and reopened nine months later. And the G. T. M. — Goodyear Technical Man — found that the Coal-Flo main conveyor was as good as new and didn't need a thing done to it before going back in service!

Coal-Flo conveyor belts are serving under all sorts of below-ground conditions, handling r.o.m. coal longer, with minimum maintenance and maximum savings for mine operators. Ask the G. T. M. to discuss your coal-handling problems, or write Goodyear, Akron 16, Ohio.



FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS *built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor. Look for him in the yellow pages of your Telephone Directory.*

GOODYEAR

THE GREATEST NAME IN RUBBER

We think you'll like "THE GREATEST STORY EVER TOLD" – Every Sunday – ABC Network

Coal-Flo—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

The Road to Profitable, Continuous Mining Leads Straight Through An Adequate Surge Bin



One who has not observed automatic coal haulage cannot visualize the continuity and smoothness of the operation. The cars are loaded and hauled by locomotives in the usual manner. As the trip of cars approaches the head house, they pass over an automatic scale where the coal is weighed in motion. The trip moves on to large surge bin (see photo at right) where the cars automatically lay down their load of coal without breakage and without hesitation.



SANFORD-DAY IRON WORKS

S-D "Automatic" Cars and an Adequate Surge Bin Are Indispensable to Low Cost Mining Today.

This Combination Has As Much To Do With Cutting Your Mining and Preparation Costs As It Does In Reducing Your Haulage Costs!

A continuous supply of coal from the face to the preparation plant is absolutely necessary to produce coal at the lowest possible cost. The only dependable way this can be accomplished is through the use of an adequate surge bin which will serve as a temporary storage for coal in transit. The only practical method of filling a surge bin is with Automatic Bottom Dumping Cars. This Surge Bin used with S-D "Automatic" Cars permits your mining operations and preparation plant to function independently of each other. For each to operate at the lowest possible cost, they must be carried on independently:

1. Any cleaning plant works best, and at the least cost, with an even continuous supply of coal. The Surge Bin continues to supply coal to the preparation plant when, for any cause, there is a delay at the face.
2. With an adequate surge bin, one shift operation of cleaning plant is often sufficient to take care of two shift operation of mine. Breakdowns or delays at the preparation plant need not stop mine production because the surge bin will take the coal until repairs are made.

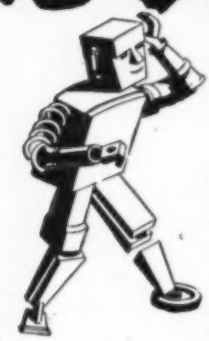
The most economical means of filling a bin is with S-D "Automatic" Bottom Dumping Cars. Usually about 40% fewer S-D "Automatic" Cars are needed because of constant, on-the-move dumping. This lowers the initial installation cost and, of course, maintenance cost. S-D "Automatics" are sealed against dust leakage, reducing track clean-up costs to the minimum. S-D "Automatics" eliminate all manual dumping. This one item is enabling many operators to save thousands of dollars every year! For example, one operator who installed 16 S-D "Automatics" reported he was saving $20,000 annually by eliminated manual dumping. Another operator, who installed 250 S-D "Automatics" reported he was saving $100,000.00 annually. Those are cold black figures that in some mines mean the difference between profit and loss! The flexibility of S-D "Automatics" offers additional advantages such as: cars are not limited in size . . . top extensions may be added . . . cars with overlapping ends may be used. Investigate the S-D "Automatic" System now! It may pay you in thousands of dollars annually. Write us today!

S-D "Automatics" haul your coal, non-stop, as it is mined until the surge bin has been completely filled (see photo at right) and the coal has been automatically leveled with the track from end to end. After dumping, the car doors are automatically closed and the trip runs smoothly back into the mine for reloading. Slate cars are dumped selectively at wells or slate bins enroute. The whole smooth, continuous operation is accomplished without stopping, with the same locomotive coupled to the same cars and with no delay.



Knoxville 1, Tennessee

STEEL SCRAP is VERY SCARCE



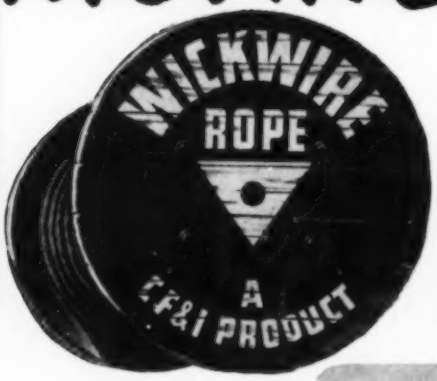
America's steel industry is essential to the nation's defense.

Large quantities of scrap are used by the steel industry.

YOU—in your plant or on your property have scrap that's urgently needed.

Unless you turn your scrap over to your scrap dealer, the steel so vital to American industry cannot be made.

GET YOUR SCRAP MOVING...TODAY



LOOK FOR THE YELLOW TRIANGLE ON THE REEL

Wire Rope—sinewy muscle of industry—is one more of the many products of steel upon which America depends for the increased production necessary to meet both civilian and defense demands.

Here, too, your scrap contribution is of vital importance... enabling us to serve you better... helping to provide you with continued, uninterrupted supply.

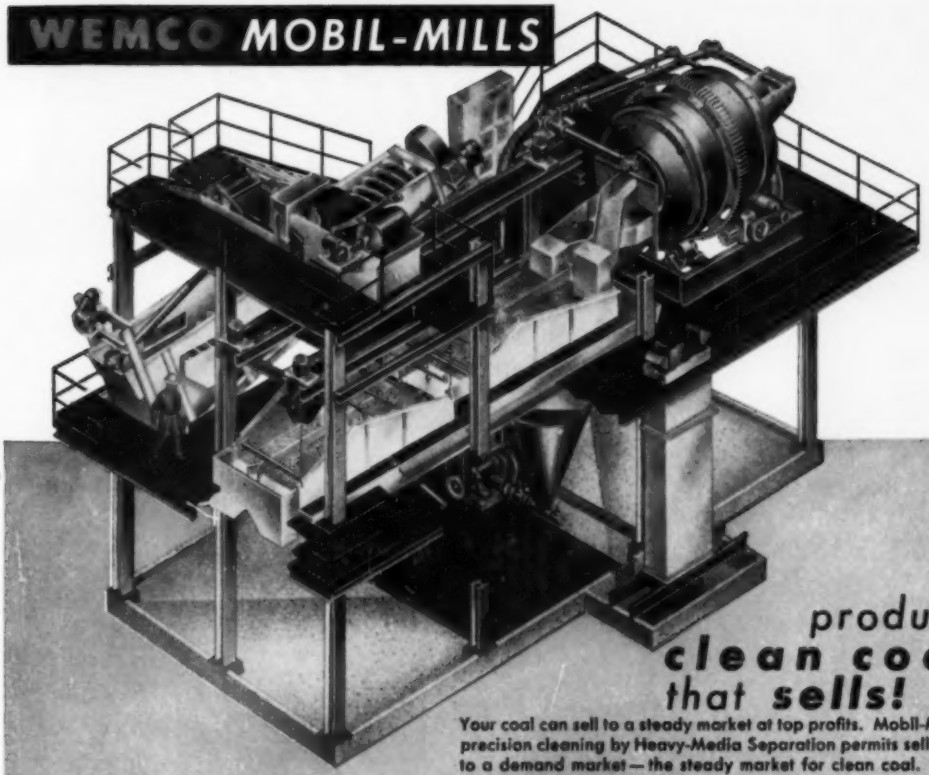
THE CALIFORNIA WIRE CLOTH CORP.— Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
THE COLORADO FUEL & IRON CORP.— Abilene (Tex.) • Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
WICKWIRE SPENCER STEEL DIV.— Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) Philadelphia • New York

WICKWIRE ROPE

CF&I

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL & IRON CORPORATION

WEMCO MOBIL-MILLS



produce *clean coal that sells!*

Your coal can sell to a steady market at top profits. Mobil-Mill precision cleaning by Heavy-Media Separation permits selling to a demand market—the steady market for clean coal. Of many operators who have installed WEMCO Mobil-Mills to swing sales upward and change losses to profits, an Illinois coal producer is a typical case.

Nearly out of business because of a rapidly diminishing demand for unwashed coal, this Illinois operator installed a #3C WEMCO Mobil-Mill to wash approximately 60 TPH of 4" x 3/8" coal. Results were impressive. 91% of his total feed was recovered as readily saleable clean coal with ash content reduced from 13% to 9.1% (6% inherent ash). 99½% of the Mobil-Mill washed coal reported as true float (by heavy liquid test), and media consumption was only 0.67 lbs. per ton of H.M.S. feed. As a result, this operator now produces a product which more than meets his market demands.

WEMCO Mobil-Mills fit your requirements. All coal to 8" can be washed. Capacities range from 25 to 350 TPH with a choice of equipment to suit your application.

7 REASONS WHY WEMCO MOBIL-MILLS HAVE OUTSOLD ALL OTHER HEAVY-MEDIA SEPARATION PLANTS COMBINED:

- *Prefabricated*
- *Low initial cost*
- *Fast installation*
- *Compact design*
- *Low operating cost*
- *Clean, sharp separation*
- *Installed for you*

***WRITE TODAY** for new bulletin giving complete information on how a Mobil-Mill can greatly improve the price and saleability of your coal.*

WEMCO
WESTERN MACHINERY COMPANY
760-766 FOLSOM STREET · SAN FRANCISCO 7, CALIFORNIA

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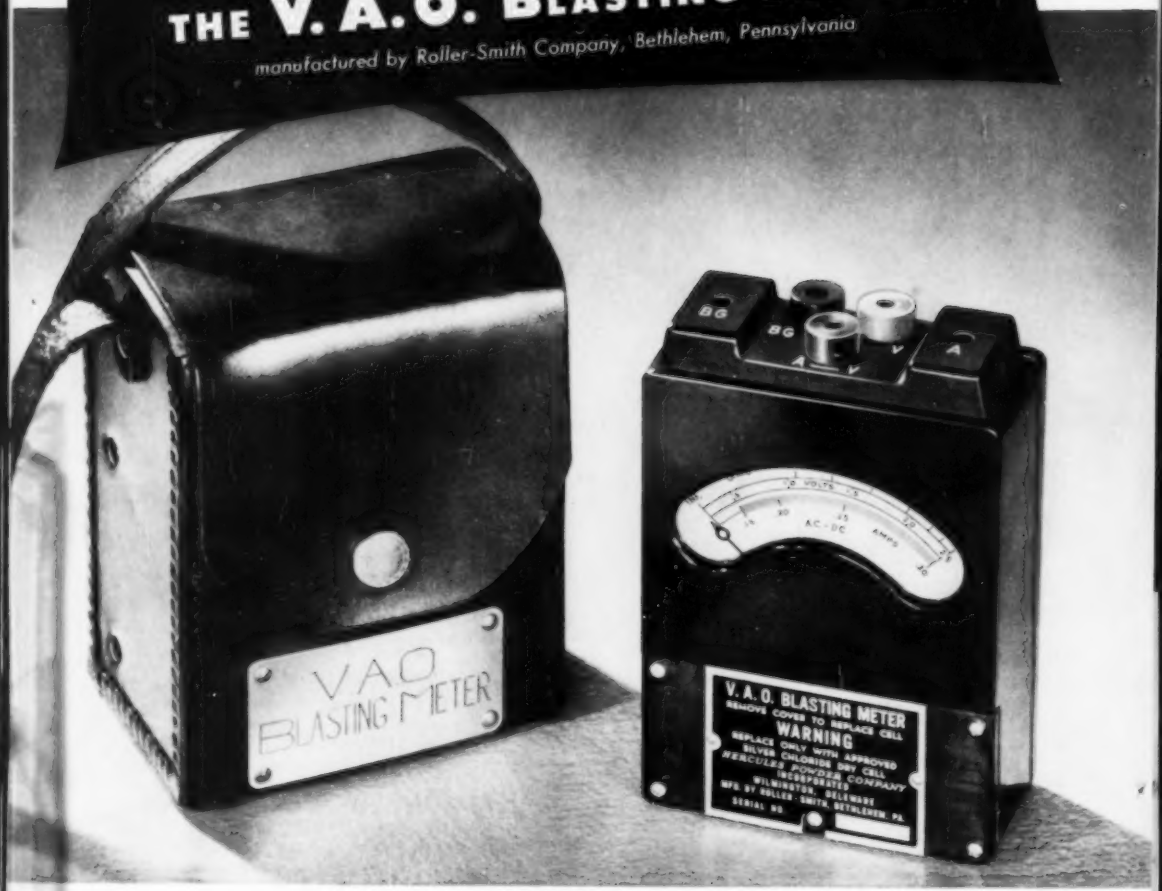
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HMS THICKENERS	HYDROSEPARATORS	S-M CLASSIFIERS
HMS PUMPS	HMS LABORATORY UNITS	THICKENERS
DENSIFIERS		SAND PUMPS
CONE SEPARATORS		CONDITIONERS
DRUM SEPARATORS		

Announcing

THE V. A. O. BLASTING METER

manufactured by Roller-Smith Company, Bethlehem, Pennsylvania



A combination voltmeter, ammeter, and blasting galvanometer for practical field use

The V. A. O. (volts-amperes-ohms) Blasting Meter, embodying design features suggested by Hercules explosives engineers, marks a major development in the field of blasting instruments. Important features of the V. A. O. Blasting Meter are:

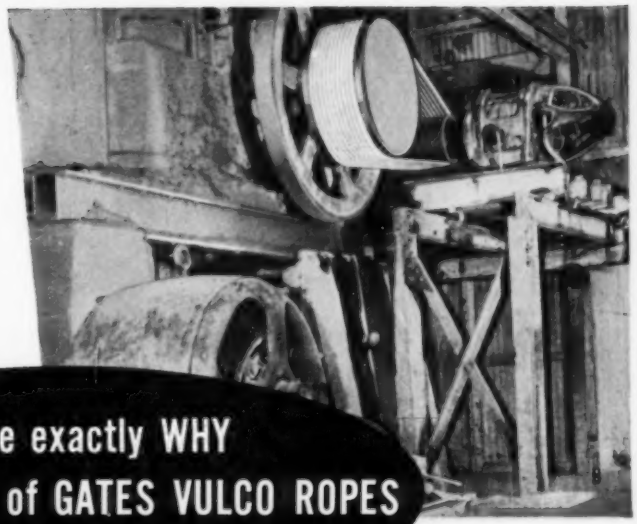
1. It contains the necessary electrical components, adjusted to specific ranges, for checking stray currents and voltages around blasting operations.
2. It is equipped with a rectifier and, therefore, can be used for detecting either alternating or direct current and voltages.
3. It can be used as a blasting galvanometer for checking the circuit of individual electric detonators or detonators connected in series.

See booklet, which will be furnished on request, describing the V. A. O. Blasting Meter and giving instructions regarding its use. This instrument is now available through Hercules representatives.

HERCULES POWDER COMPANY Explosives Department, 936 King Street, Wilmington, Delaware

XR52-1

A large jaw crusher at the mill of a big copper mine in Sonora, Mexico, is driven by Gates Vulco Ropes. Picture shows the discarded motor still in foreground.



Let's see exactly WHY the Concave Sides of GATES VULCO ROPES mean lower V-Belt Costs!



Every engineer knows how a V-belt *changes shape* when it bends around a pulley.

The top of the belt is under tension—making it grow *narrower.*

The body is under *compression,* causing the sides to bulge out!

Look at figure 1-A in the diagrams, herewith. There you see how a *straight sided* V-belt is forced to bulge in its sheave-groove—and this bulging naturally causes extra wear along the middle of the sides as indicated by the arrows.

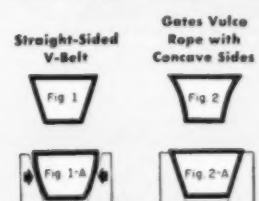
Now look at the figure 2-A. There you see how the precisely engineered Concave Sides fill out to an exact fit in the sheave groove.

Clearly, the Concave Sides press *evenly* against the V-pulley. This means uniform wear; longer life! The Concave Sides have *full traction;* wear longer because of *full contact!*

To sum up: The Concave Sides of Gates Vulco Ropes (U.S. Patent No. 1813698) give you (1) Less wear, (2) More pulley contact, (3) More sure power transmitted when needed!

Only V-belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure you get the V-Belt with the Concave Sides—The Gates Vulco Rope!

What Happens When a V-Belt Bends



How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.

The Concave Sides Fill out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

CS-521

World's Largest Maker of V-Belts

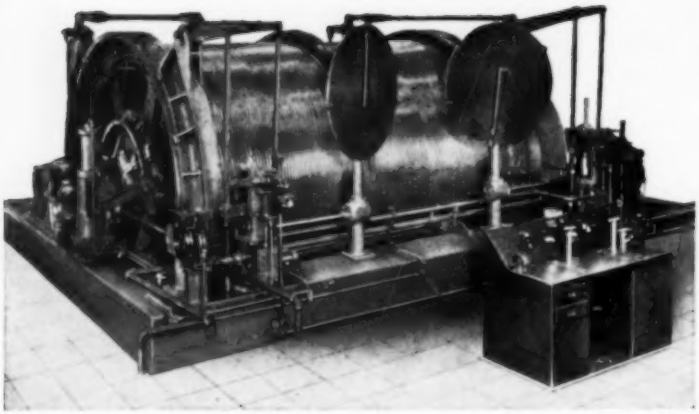
Gates

Hose V-Belts Molded Rubber Goods for Industry

VULCO ROPE DRIVES

ENGINEERING OFFICES AND JOBBER STOCKS IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY • DENVER • U•S•A



Roller-Bearing Electric Hoist for metal mine, assembled inVulcan shop. To be driven by dual 250 hp. motors (not shown in illustration) through flexible couplings and single-reduction herringbone gears running in oil. Main shaft and pinion shafts mounted in spherical-roller-bearing pillow blocks. All operating levers and instruments grouped at control desk on floor level.

Equipped with parallel-motion post-type brakes on each drum and toothed-type positive clutch on one drum. Brake and clutch engines operated by oil-hydraulic pressure. Clutch and brake on loose drum mechanically and electrically interlocked. All-steel drums are 10'-0" diam. by 6'-2" face, with machine-cut grooves for 1609 ft. of $1\frac{1}{8}$" rope in one layer. Each drum is equipped with a gear-driven safety controller which provides complete protection for hoisting from several different levels.

For Faster, Safer, Hoisting... Rely on

VULCAN HOISTS AND SHEAVES



Vulcan Allcasteel Sheave pressed on alloy-steel shaft and mounted on self-aligning "spherical" roller-bearing pillow blocks. Besides being light and very strong, Vulcan Allcasteel sheaves are so resistant to rope wear that liners are seldom needed. Manganese steel liners are furnished, however, when required. All sizes are available with either plain or anti-friction bearings.

Used by leading mining companies for more than a quarter of a century, Vulcan Allcasteel Sheaves have thoroughly proved their superiority for long-time heavy-duty service. Bulletin A-396 (20 fully-illustrated pages) gives complete information.

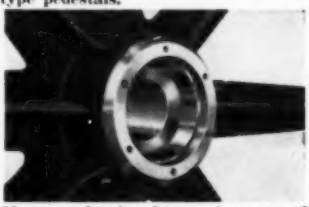
Vulcan Electric Hoists are available in a wide range of types and sizes, from 5 to 5000 hp., to meet every requirement of the mining industry. Machine-cut steel gears and very sturdy construction throughout, assure long service life with minimum maintenance expense.

Bed plates and frames can be of either cast iron, cast steel or fabricated steel plate as preferred by the purchaser. Drums can be either cylindrical, conical or cylindro-conical; of either cast iron, cast steel, or "Built-up" all-steel construction. Modern designs and dependable safety devices promote efficient operation and permit high-speed hoisting, when required, without strain on the operator.

Heavy-duty Vulcan hoists are always designed and built especially to meet the purchaser's operating conditions. Self-Contained, Scraper-Loading, Car-Spotting and Room Hoists are available in standardized types and sizes to meet any probable requirement. Bulletin A-407 (32 fully-illustrated pages) gives complete information.



Vulcan Allcasteel Sheaves with tapered roller bearings in hubs. "Dead" shaft is mounted in all-steel clamp-type pedestals.



Close-up showing how outer race of tapered roller bearing is pressed into hub of Vulcan Allcasteel Sheave.

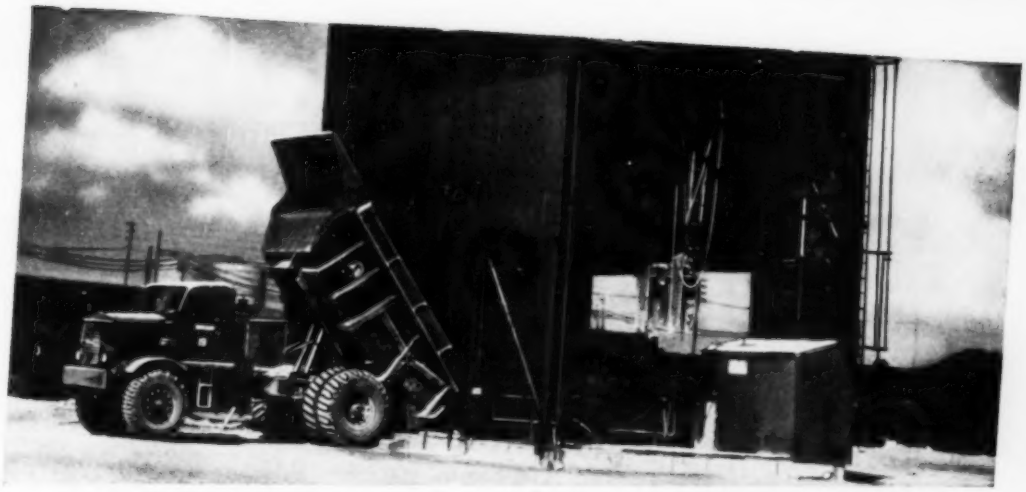


Tapered roller bearing on alloy-steel shaft of Vulcan Allcasteel sheave.

VULCAN IRON WORKS

Main Office and Works WILKES-BARRE, PA., New York Office 50 Church

Heavy-Duty Electric Hoists	Shaking-Chute Conveyors	Steam Locomotives	Load-Carrying Larries
Self-Contained Hoists	Chain Conveyors	Diesel Locomotives	Rotary Kilns, Coolers and Dryers
Scraper Hoists	Cast-Steel Sheaves and Gears	geared and electric drive	Briquetting Machines
Car-Spotting Hoists	Cages, Skips and Gunboats	Gasoline Locomotives	Heavy Special Machinery
Room Hoists	Toothed Double-Roll Crushers	geared and electric drive	Open-Hearth Steel Castings



Why are more tons hauled on Goodyear tires than on any other kind?



The ROAD LUG is one reason!

For trucks that operate both OFF and ON the road, this dual-purpose tire is best. Tough construction and special tread design provide super-traction off the road—long, smooth mileage on the road.

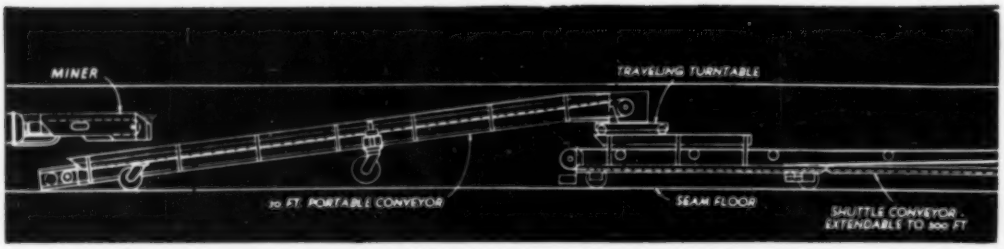
The HARD ROCK LUG is another!

For tire-bruising, heavy-duty off-the-road work, this super-rugged tire is tops. Its tough armored carcass and extra-husky lugs assure more wear, better performance even in the toughest going.

GOODYEAR

We think you'll like "THE GREATEST STORY EVER TOLD"—Every Sunday—ABC Network

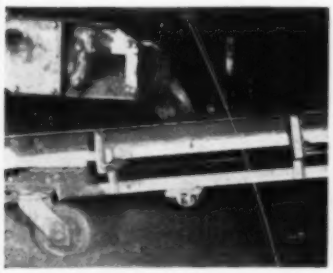
Road Log—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio



Continuous Coal Production

FROM FACE TO PREPARATION PLANT!

Hewitt-Robins Belt Conveyor Mining Method takes coal from the face continuously as fast as any mechanism can produce it...and can lower your transportation costs!



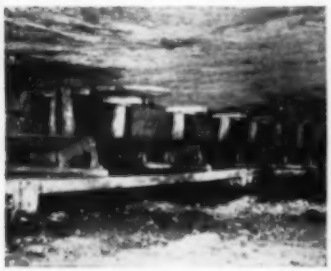
AT THE FACE, a portable Belt Conveyor takes coal *continuously* as fast as *any* machinery can produce and discharge it. The unit can be used in coal as low as 30". Rubber-tired, free-swinging casters make the portable easy to move and handle.



FROM THE FACE, the portable unit feeds the coal directly onto a shuttle Belt Conveyor. The latter consists of 8' pin-connected intermediate sections, each equipped with a pair of rubber-tired wheels. A covered deck protects the return strand of the Belt.



TO TRANSFER CONVEYOR. The shuttle Belt Conveyor delivers the coal onto a transfer Conveyor at a fixed-point discharge unit. The discharge pulley can be lowered when moving to another room or entry or when advancing the unit.



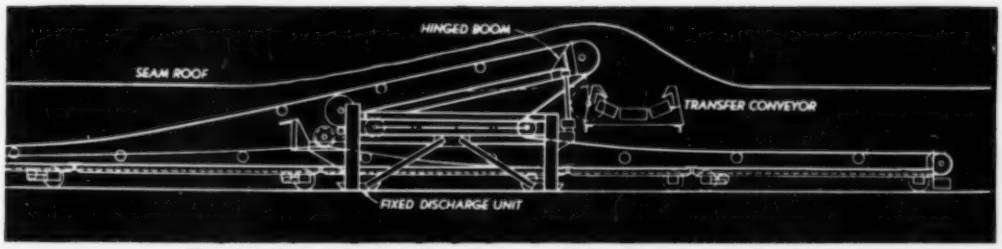
TO PANEL-ENTRY CONVEYOR. The transfer Conveyor feeds the coal onto a panel-entry Mine Conveyor. The latter is assembled with 8' or 10' intermediate sections of 26", 30" or 36" width or wider. Sections are made for drop-in assembly; easily installed and extended.



TO MAIN HAULAGE CONVEYOR. The panel-entry Conveyor discharges the coal onto a main line Belt Conveyor system which consists of multiple tandem units assembled from 12' rigid intermediate sections. Such systems provide haulage from 500' to 5000'.



INTO PREPARATION PLANT. The coal is delivered from the main haulage system onto a slope Belt Conveyor (inclined or declined) for transfer into the preparation plant. From start to finish, coal transportation is *continuous*, fast, economical.



This schematic drawing indicates how coal moves *continuously* from face to transfer point.

The Hewitt-Robins Belt Conveyor Mining Method gives you genuinely *continuous* output—from face to preparation plant—and can lower your transportation costs. Whether your seam is 30" or 42" or higher, coal can be taken from the face *continuously* as fast as any mechanism can produce it.

AT THE FACE. Here the compact portable Belt Conveyor handles coal on a 24" Belt directly from *any* loading machinery. It is independently powered and controlled. The portable swivels in a 45° arc to right or left on the traveling carriage mounted on its discharge end—and also advances as face-cutting progresses.

FROM THE FACE. The portable feeds directly onto a rubber-tired shuttle Belt Conveyor, an extendable traversing unit using 24" wide Belt (minimum) and capable of handling up to 250 tons per hour. Lengths up to 500' can be supplied.

The shuttle Belt Conveyor is moved forward with the face by a rope haul. It receives coal from the portable or directly from the miner. Delivery to a transfer Conveyor is by means of a fixed-point discharge unit. The discharge at this fixed point can be adjusted for height to assure proper transfer of coal. It can also be lowered when transporting the unit from one room or entry to another in 30" or 40" coal —as well as for advancing in the entry being worked, *without taking roof or bottom*.

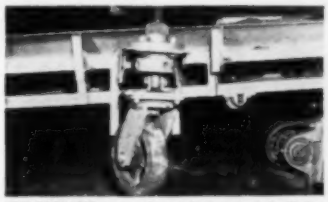
As long as coal is up ahead to be removed, the shuttle Belt Conveyor moves forward to get it, while the stationary discharge unit keeps transferring it. As the working end of the Conveyor advances in-by toward the face, the storage conveyor length extended out-by at the fixed-point discharge unit is utilized to keep pace with progress at the face. Extra storage length for an entire working shift can be assembled and installed *with no interruption in output*.

FROM TRANSFER POINT. Coal can be moved *continuously* to the foot of the slope by Hewitt-Robins standard panel-entry Mine Conveyor or other transverse Conveyor medium.

INTO PREPARATION PLANT. To assure *continuous* coal delivery—at low transportation cost—the panel-entry Mine Conveyor delivers to a Hewitt-Robins main haulage Belt Conveyor, then transfers it to a slope Belt Conveyor for movement into the preparation plant.

GET COAL CONTINUOUSLY . . . from face to the plant—at low cost. Use the Hewitt-Robins Belt Conveyor mining method. Hewitt-Robins Mine Conveyors are sold as *standard* package-units. Both Troughing and Return Idlers are adjustable for Belt training, have anti-friction bearings and the Hewitt-Robins one-shot lubrication feature. Lagged pulleys assure maximum power transmission.

Only Hewitt-Robins manufactures both machinery *and belt*. Only Hewitt-Robins can provide—from within its own corporate structure—every element of successful Belt Conveyor performance . . . from designing and engineering through manufacture and erection. Write for Bulletin No. 153 containing details of the Hewitt-Robins Belt Conveyor mining method. Address: Hewitt-Robins Incorporated, 1010 Pennsylvania Ave., Charleston, W. Va., or 270 Passaic Ave., Passaic, New Jersey.



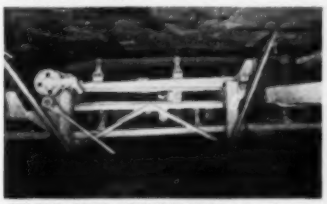
THE PORTABLE rises clear of the shuttle Belt Conveyor and swivels on its own discharge end. A pair of vertically-adjustable auxiliary casters, normally above bottom while the portable is in operation, are lowered when the unit is moved separately.



THE SHUTTLE BELT CONVEYOR traverses backward and forward on rubber-tired, anti-friction bearing wheels. Flanged wheels can be supplied for use on prefabricated light track. Idlers for return strand of Belt are dropped in easily. Note rope-haul anchor.



VERTICAL GUIDE PULLEYS, equipped with anti-friction bearings and mounted on standard roof jacks, are installed with staggered spacing of approximately 30' to maintain accurate alignment of the Belt when rubber-tired casters are used.



THE FIXED-POINT DISCHARGE UNIT of the shuttle Belt Conveyor is equipped with all operating and traversing controls as well as Takeup. Push-button control is also provided *adjacent to the miner*. Complete control of all operations is doubly positioned for top efficiency.

Hewitt-Robins is participating in the management and financing of Kentucky Synthetic Rubber Corporation.

HEWITT-ROBINS

MINE CONVEYORS

HEWITT-ROBINS INCORPORATED

BELT CONVEYORS *(belting and machinery)* • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS
FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS
MOLDED RUBBER GOODS • RUBBERLOKT ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS
STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

Rope leads from

UPSON-WALTON



Selecting the "lay" of wire rope

● An important characteristic of a wire rope is its *lay*—the relative directions in which wires in the strands, and strands in the rope are twisted.

In *regular lay* rope, the wires in the strands are twisted in the opposite direction to the strands in the rope.

However *lang lay* rope—in which wires and strands are twisted in the same direction—offers several advantages:

- **it flexes better**
- **it has more resistance to abrasion**
- **it has more resistance to bending fatigue**

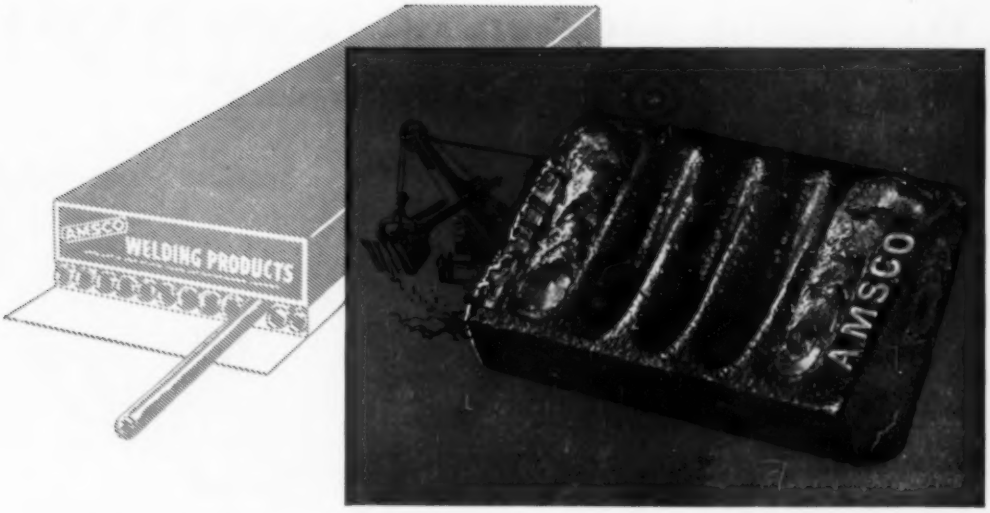
When choosing *lang lay*, be sure to specify that it be "preformed". An extra operation in the manufacture of Upson-Walton's LAYRITE preformed rope forms the wires and strands in a fixed spiral. This frees each part from internal stress. Years of rugged service have shown that Upson-Walton's LAYRITE wears longer, cuts maintenance costs.

Specify it on your next tough job.

THE UPSON-WALTON CO.
CLEVELAND, OHIO
NEW YORK • CHICAGO • PITTSBURGH

wire rope • rope fittings
brattice cloth • tackle blocks

MATCH YOUR WIRE ROPE TO YOUR FITTINGS AND BLOCKS . . . ONLY UPSON WALTON OFFERS ALL THREE



NOW! Wear your point and have it too!



This new catalog can help you save money on repair costs . . .

It's packed with information on the new "Wear-Sharp"—and the entire AMSCO Weldment line. Complete with installation instructions and helpful hints on welding. Be sure to ask for your free copy.

AMSCO "Wear-Sharps" are available in two quickly and easily installed types:



Crescent Back
For application to worn tooth with minimum fitting.



Straight Back
For application after worn tooth is beveled.

U. S. Pat. No. 2,247,202

New AMSCO "Wear-Sharp" repointer holds a straight edge as it wears . . . and stays sharp longer!

Here's a new tooth repointer that is just what you've been looking for . . . the AMSCO "Wear-Sharp", *and it does exactly what the name implies.*

Note the groove design on this new repointer shown above. The outside and end grooves are AMSCOATED with Amsco Hardfacing Electrodes specially recommended for this purpose, while the inner grooves are left as they are. Result?

The Amscoated grooves wear slower, thus equalizing wear along the entire cutting edge and making the point stay sharp longer. Rounded, blunted corners that cut digging efficiency and waste power are completely eliminated for the life of the repointer!

The "Wear-Sharp" is already setting new records in service life and digging efficiency. For example, an Eastern mine reports *6 times longer service than any repointer ever used before.*

The next time your dipper teeth need repointing, try the new "Wear-Sharp"! Write today for illustrated catalog shown at left—and name of your nearest AMSCO Distributor.

AMSCO WELDMENTS
THE RIGHT WAY TO MAKE REPAIRS

Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
409 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.

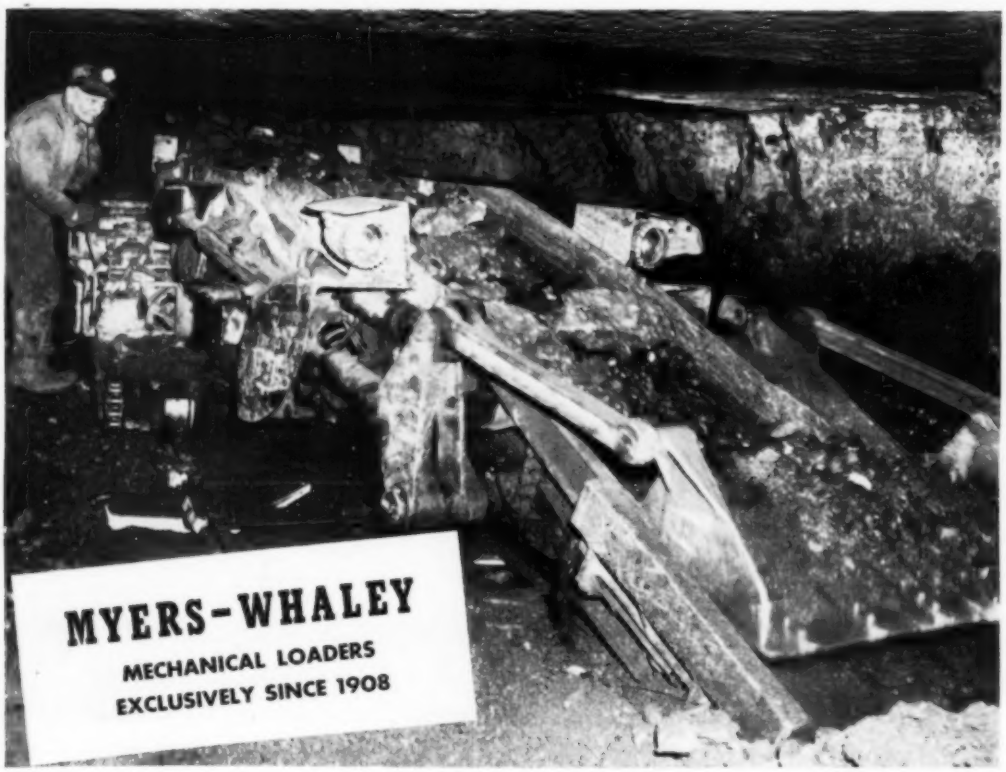
We Build Mechanical ENDURANCE into the Whaley "Automat"

Call it enginous engineering . . . or just plain mechanical endurance! The important thing is that the powerful Whaley "Automat" has the built-in ability to stay on the job longer—loading consistently day-in and day-out!

For more than 43 years our entire engineering ability has been devoted to building loading machines exclusively! We believe we know the requirements that make mechanical loading most effective and most profitable. One of these requirements is consistent loading. Capacity means absolutely nothing when your loader is down. The "Automat's" rugged construction guarantees an absolute minimum of loader break-down delays. The "Automat's" simplicity guarantees a quick repair and early return to loading. Result: Consistent, Efficient loading in any class of material!

Investigate the powerful Whaley "Automat" now! Write for our new Catalog 250 giving you every detail of the consistent loader! Myers-Whaley Co., Knoxville, Tenn.





the RIGHT gear ratio for load, road, and type of service



means more and faster trips, lower cost, longer truck life

EATON 2-Speed Axles *double* the conventional number of gear ratios, giving drivers a *right* ratio for every operating condition—on the highway, or off, starting out under full load, climbing grades, highballing, quick shifting in traffic. Engines run in the most efficient and economical speed range, reducing stress and wear on engines and power transmitting parts; adding thousands of miles to vehicle life. And Eaton Axles last longer because exclusive planetary gearing better distributes gear tooth loads. The exclusive Eaton forced-feed oiling system provides positive lubrication at all vehicle speeds. Ask your dealer to show you how Eaton 2-Speeds will help *your* trucks haul more, faster, longer, at lower cost!



Axle Division
EATON MANUFACTURING COMPANY
CLEVELAND, OHIO

EATON 2-Speed Truck AXLES

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for fast roof bolting

***especially* in**

thin seams



In an Indiana mine this CP Mobile Unit drills hole and tightens expansion bolt in less than five minutes.

The low clearance of the electrically-powered CP MOBILE ROOF DRILLING and BOLTING UNIT makes it particularly ideal for operating in thin seams. Its overall height, in lowered position, is only 28 inches. Its weight of only 575 pounds, makes the unit easy to move into position under difficult conditions. Feed is 30 inches, and telescoping chuck adapter permits 10 inches of additional auger adjustment. The unit is just as efficient in seams of any height.

One motor drives both auger and nut-runner. This motor can readily be shifted to permit withdrawal of drill steel without moving the unit. Built-in slip clutches permit adjustment of nut-running torque, protect drill motor and feed motor against stalling. Write for complete specifications.



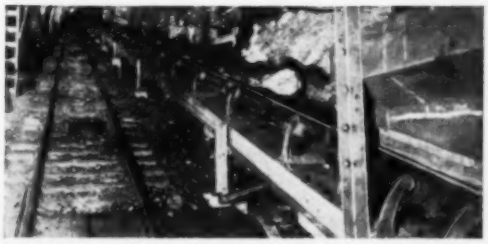
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General Offices: 8 East 44th Street, New York 17, N. Y.

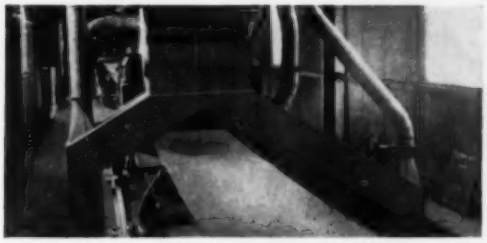
PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

For heavy-duty conveyors...

IT'S TIMKEN...



These Rex troughing idlers equipped with Timken bearings have already seen grueling service on the world's longest conveyor that helped build Shasta Dam. They're still on the go—this time hauling coal.



This 295-foot conveyor has been transporting soybeans since 1940. Timken roller bearings in the Continental Gin Company Idlers assure long life with minimum maintenance.

AND TIMKEN...



One of four 860-foot limestone storage conveyors with travelling stackers and 79-foot wing conveyors. Built by Stephens-Adamson Manufacturing Company and in service since 1930, the stackers' idlers are Timken bearing equipped for trouble-free operation.

AND TIMKEN AGAIN!

AND HERE ARE 6 BIG REASONS WHY:

1 **THOROUGHLY PROVED.** The Timken® bearing is the only tapered roller bearing proved by 15 years or more of service in heavy-duty conveyor installations using the popular dead shaft construction.

2 **EXTRA CAPACITY.** Line contact between rollers and races gives Timken bearings high load capacity. And by using Timken bearing sizes that are mass produced for the automotive industry you get extra capacity bearings that actually cost *less* than the smaller sizes you'd normally use.

3 **LONG-LIFE LUBRICATION.** Not just lubricated for "life" but lubricated yearly or as conditions require to insure *long* life. Fresh lubricant ends gummy, sticky, jammed bearings.

4 **LONGER ROLLER AND BELT LIFE.** Less sliding and scuffing between idlers and belt.

5 **FRICTION MINIMIZED.** Timken bearings' true rolling motion and extremely smooth surface finish practically eliminate friction.

6 **MAINTENANCE REDUCED.** Long life and dependable performance of Timken tapered roller bearings cut maintenance to a minimum.

Remember "Timken" is not a bearing type. It is a trade-mark applying only to bearings made by The Timken Roller Bearing Company. Always insist on Timken bearings for the conveyors you buy or build. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

Wherever the going's tough industry turns to

TIMKEN
TAPERED ROLLER BEARINGS





Typical applications of Timken bearings for conveyor idlers.

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL AND THRUST → LOADS OR ANY COMBINATION

ROCK RATED!

MEANS RUGGED STRENGTH

P&H MAGNETORQUE*

MEANS SMOOTHER, FASTER SWING



IF YOUR work calls for heavy going — in mine and quarry — here's the machine *designed* for it — the P&H 1055 (3½ yds.).

Here's tough, all-welded construction to take abuse in stride . . . extra stability so you can use all the power you need . . . speed and smooth operation in every function to give you maximum output.

MAGNETORQUE ELECTRIC SWING gives you faster swing, more accurate control with less strain on machine and operator. No more swing frictions with their adjustments and replacement costs.

See this real ROCK RATED shovel in action and judge for yourself.

*T. M. of Harnischfeger Corporation for electro-magnetic type clutch.

P&H HARNISCHFEGER CORPORATION

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EXCAVATORS • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • CRAWLER AND TRUCK CRANES • DIESEL ENGINES • CANE LOADERS • PRE-ASSEMBLED HOMES

JOY S.P.B.* CONNECTORS



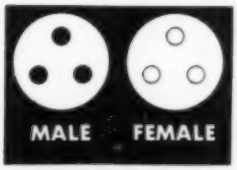
FOR PRICES SEE JOY
PRICE SHEET 5214-2

*JOY Straight Pin Bigun (S.P.B.) Connectors are built for rough everyday service. Equipped with rust-proof threaded metal coupling (see cut-away sketch) and the famous JOY two-way water seal, they can't be surpassed for performance, safety and durability . . . and because they're molded to cable as one-piece Neoprene units, they're shatter-proof, wear-resistant and highly impervious to the deteriorating effects of moisture, grime or oils. Through them power cable can be sectionalized into easily handled lengths that facilitate rapid replacements of damaged sections.

Available for A.C. or D.C. operation in current capacities to match job requirements. Choice of one through four conductors with choice of contact arrangements illustrated and described below.

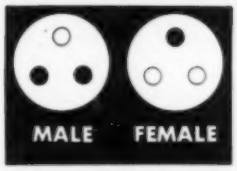
Choice of 4 Contact Styles

Rated at 600 volts maximum



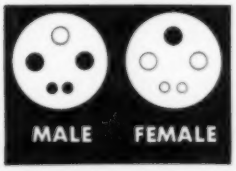
STANDARD PIN PLACEMENT

Available in single conductor design for wire sizes 14 through 1000 MCM . . . and in two, three or four conductor styles for wire sizes 14 through 4/0.



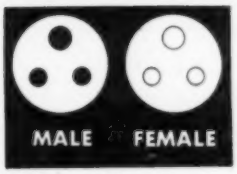
REVERSED PIN PLACEMENT

All contacts same size, however, one contact reversed in Male and Female plugs for grounding and polarization. Available in three or four conductor styles for wire sizes 12 through 250 MCM.



PILOT PIN DESIGN

Same number of conductors and wire sizes as listed above for reversed pin placement series, however, have two additional small "pilot-control" contacts. Supplied with these contacts shunted or carried through cable on two #10 wires.



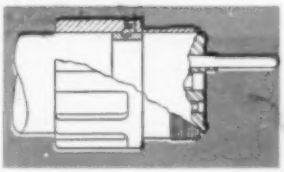
ENLARGED PIN DESIGN

Supplied with one larger contact on Male and Female plugs for grounding and polarization. Available in three or four conductor styles for wire sizes 12 through 250 MCM.



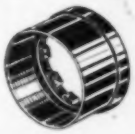
Consult a Joy Engineer

Ask him for a copy of Bulletin RV 106 on JOY Cable Vulcanizers, too.



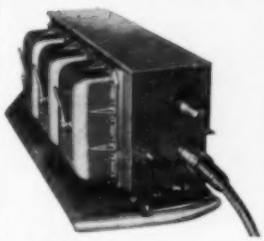
S.P.B. CONNECTORS are easily engaged or disengaged. Threaded "fire-hydrant-type" couplings quickly and positively connect or disconnect (see sketch for details) Couplings on larger size connectors equipped with ball bearings. Damaged couplings quickly replaceable from factory stock.

PROTECTIVE NEOPRENE SLEEVE—Available for S.P.B. Connectors 2" or over in diameter. Fits over metal couplings on female style connectors. Protects exposed male threads. Will not interfere with coupling or uncoupling procedure.



SAFETY CIRCUIT CENTERS

FOR PRICES SEE JOY PRICE SHEET No. 5225-2



No. PGGK—PERMISSIBLE STYLE THREE OUTLET S. C. C. ILLUSTRATED

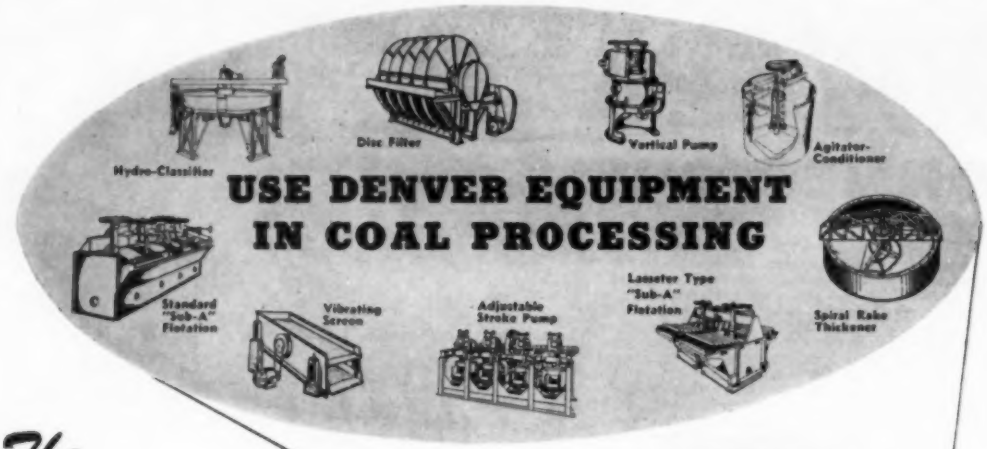
Ideal for all mechanized mining power transmission systems, Joy SCC's are supplied with 1, 2, 3 or 4 outlets in A.C. or D.C. current ratings to match any need. Fully protect personnel and equipment; permit power delivery through minimum lengths of sectionalized cable. Available in two styles (Permissible and Dust Resistant) both equipped with fast-acting circuit breakers. No fuses, tools or extra parts required to restore power after correcting a fault in cable. Supplied with or without pilot control circuits.

W&D ME3469

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

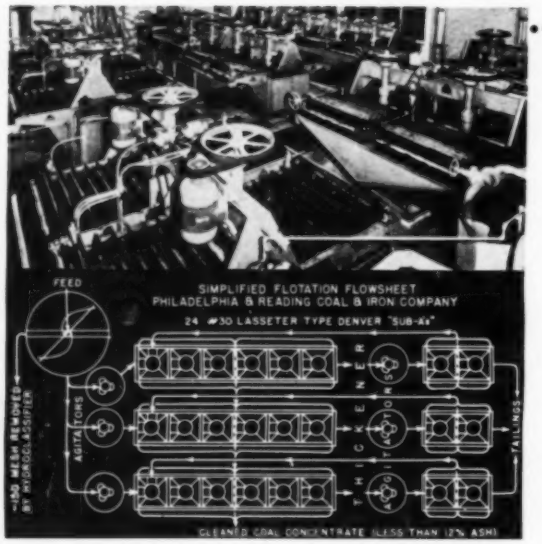
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



The

PHILADELPHIA & READING COAL & IRON CO. *Uses*

DENVER "SUB-A" (Lasseter Type) FLOTATION



...TO RECOVER ANTHRACITE COAL FINES... LOW ASH CONCENTRATE AT LOW COST

Products: Anthracite Coal Fines.

Particle Size: Minus 10 mesh to plus 200 mesh.

Tonnage: 150 TPH initial feed.

Flotation Cells: 24 No. 30 (Lasseter type) Denver "Sub-A" Cells.

Flotation Feed: Ninety tons per hour (minus 150 mesh removed from original feed).

Flotation Concentrate: Sixty tons per hour. (One ton per minute.)

Ash Content: Less than 12 per cent.

Reagent Cost: Less than 15 cents per ton feed.

LIST OF INSTALLATIONS

18 installations of Denver "Sub-A" Coal Flotation in the United States; more than 32 in Great Britain and other parts of the world are proof of *Denver "Sub-A" leadership* and profit-making operation. List of companies using Denver "Sub-A" Coal Flotation will be sent on request.

Complete testing, design, engineering and equipment services are available from one source—Denver Equipment Company. Write today.

DENVER EQUIPMENT 24 HOUR SERVICE COMPANY

FLOTATION ENGINEER

DENVER • NEW YORK • CHICAGO • EL PASO

TORONTO • VANCOUVER • MEXICO, D. F.

LONDON • JOHANNESBURG • RICHMOND, AUST.

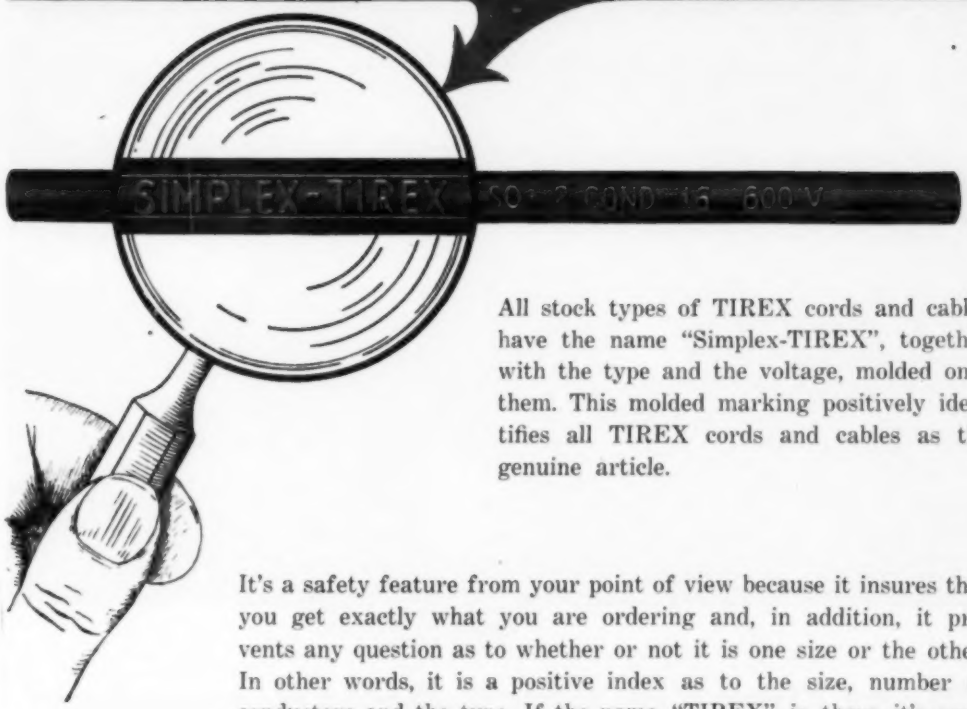
"The firm that makes its friends happier, healthier, and wealthier"

DENVER EQUIPMENT COMPANY

1401 SEVENTEENTH STREET • DENVER 17, COLORADO

CW-8110

THIS IS THE MARK OF Quality



All stock types of TIREX cords and cables have the name "Simplex-TIREX", together with the type and the voltage, molded onto them. This molded marking positively identifies all TIREX cords and cables as the genuine article.

It's a safety feature from your point of view because it insures that you get exactly what you are ordering and, in addition, it prevents any question as to whether or not it is one size or the other. In other words, it is a positive index as to the size, number of conductors and the type. If the name "TIREX" is there it's your assurance that you are getting genuine Selenium Neoprene Armored TIREX.

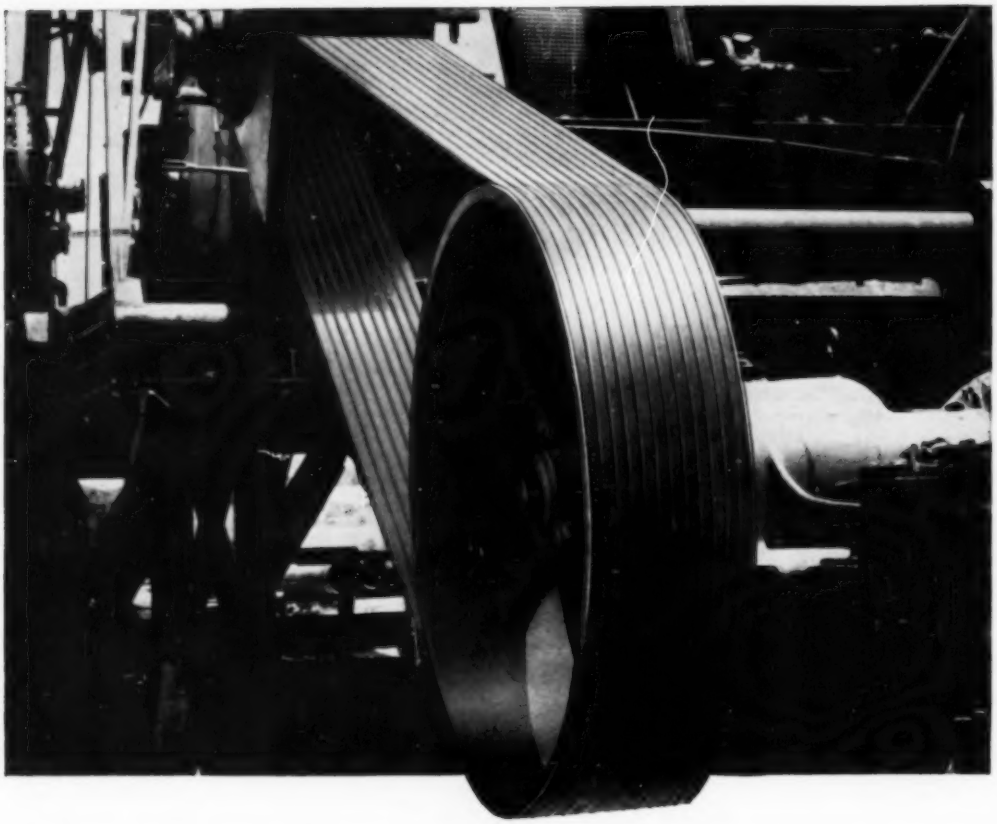
The next time you need portable cords or cables be sure you specify TIREX and then be sure you get it by insisting that the cord or cable you get is marked "Simplex-TIREX".

TIREX SELENIUM

SIMPLEX-TIREX IS A PRODUCT OF SIMPLEX RESEARCH

SIMPLEX-TIREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.



Next Time You Buy V-Belts Remember:

Bull Dog Compounds do not Crack or Deteriorate Under Severe Flexing!

Bull Dog compounds run cooler and do not crack or deteriorate under severe flexing. This simple fact explains in great part the steady, smooth, *low cost* performance of Bull Dog V-Belts . . . and their longer life! *Remember it — it will pay you well.*

Remember, also, that Bull Dogs are processed for *minimum stretch.* You'll see the operating benefits in reduced slippage and the elimination of repeated adjustments.

Durable Covers are another "more for your money" advantage — and worth remembering. Bull Dog covers are closely woven of heavy, bias cut fabric. They can withstand the punishing wear of the sheave while sealing the belt against moisture, dirt and grease.

Remember, too, that the *specially engineered* BWH cord section is outstanding in high tensile strength. This means you'll get the superior load carrying capacity you want — and the ability to absorb shock loads. What's more, when you install Bull Dogs in sets (and it's highly recommended) you are matching the uniform superiority of one Bull Dog belt with another.

TOUGH PROBLEMS INVITED — Ask us or your nearest BWH distributor about your V-belts, transmission belting, conveyor belting and hose problems. He is a specialist in making rubber products work *better, longer.*



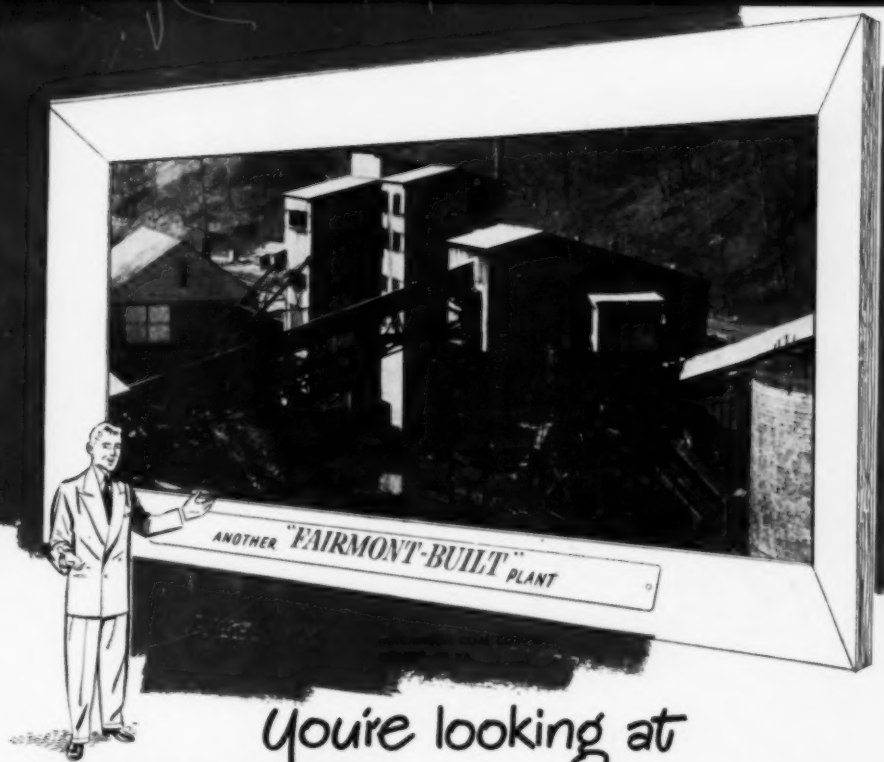
BWH
DEPENDABLE RUGGEDNESS

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Warehouse Stock: 111 N. Canal St., Chicago, Illinois — Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.



You're looking at GUARANTEED top efficiency in coal cleaning and preparation!

EFFICIENT OPERATION — Records from mine after mine show 99%+ separating efficiency!

LOWEST OPERATING COSTS — Production records show cost per ton of coal cleaned to be consistently lower than any other system!

EXTRA WIDE SIZE RANGE — ⅛" to 10"—PLUS ability to handle coal at operating gravities from 1.35 to 1.65. Washing gravity change-over on Chance Sand Flotation system can be made in five minutes by one man.

"Fairmont-Built" *GUARANTEED* plants can be designed in sizes ranging from 40 tons per hour up to any desired capacity, to suit your individual requirements. For help or advice on your coal preparation problems, call on the FAIRMONT ENGINEERS.

"FAIRMONT-BUILT"

FAIRMONT MACHINERY COMPANY

Fairmont, West Virginia

Designers and Constructors of Chance Sand Flotation Process for Wet Cleaning and American Pneumatic Separator for Dry Cleaning



"Carlon* is easier to handle!"

*** THE FIRST REAL PIPE THAT IS PLASTIC**

Lightweight, flexible, requiring fewer fittings . . . CARLON plastic pipe is easier to handle. Weighing only ⅛ as much as steel pipe of equivalent size, it eliminates the need for materials handling equipment. Flexibility permits CARLON to conform to irregular surface contours and curving slopes and entries. Furnished in long lengths (up to 400 feet) CARLON requires fewer fittings than ordinary pipe.

CARLON plastic pipe assures longer trouble-free service life. It is guaranteed against rot, rust and electrolytic corrosion and is unaffected by the chemical action of sulphurous waters, alkalies, metallic salts and other corrosive wastes. Its smooth internal surface will not accumulate scale or sediment.

FLEXIBLE CARLON is produced in all standard pipe sizes, and a complete line of molded plastic fittings is available for plastic-to-plastic or plastic-to-metal connections.

NOM. SIZE	O.D.	I.D.	EST. BURST P.S.I.	WT. LBS. PER FT.	SHPG LENGTHS
½"	0.840	0.622	340	0.103	400 ft. coils
¾"	1.050	0.824	350	0.140	400 ft. coils
1"	1.310	1.070	200	0.181	300 ft. coils
1¼"	1.660	1.380	200	0.267	300 ft. coils
1½"	1.900	1.610	200	0.320	250 ft. coils
2"	2.378	2.070	170	0.445	200 ft. coils
2½"	2.875	2.469	170	0.680	200 ft. coils
3" ⊕	3.504	3.070	165	0.910	100 ft. coils
4"	4.504	4.030	150	1.250	25 ft. str.
6"	6.630	6.070	115	2.230	25 ft. str.

Identification Stripe: WHITE—Standard Pipe; RED—Heavy-duty Pipe

Specify the Pipe with the Stripe!



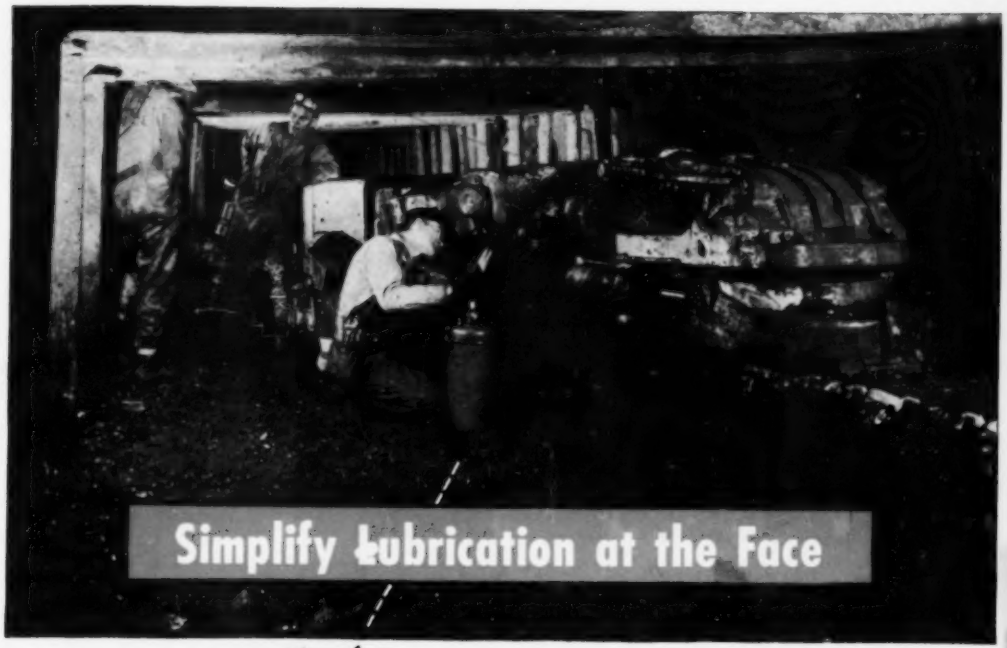
WRITE FOR CATALOGS.

CARLON CP 570-CP

CARLON PRODUCTS CORPORATION

IN CANADA: MICRO PLASTICS, LTD., ACTON, ONTARIO

10300 MEECH AVENUE • CLEVELAND 5, OHIO



with

GULF MINING MACHINE LUBRICANT

—it does the job of 2 or 3 other lubricants

—and does it better!

When you use Gulf Mining Machine Lubricant, you can eliminate from 2 to 3 other lubricants depending on the type of equipment you operate. One lubricant and a hydraulic oil for all points except the armature bearings means less confusion at the face, elimination of application mistakes.

At the same time Gulf Mining Machine Lubricant provides better protection for vital parts in cutting and loading machines. Here's why:

1. Its heavy body insures less leakage from housings and gear cases.
2. Its superior lubricating value insures less wear.
3. Its greater adhesiveness prevents throwoff.
4. It resists the washing action of water.
5. It is equally effective for plain and antifriction bearings and for certain types of drives and transmissions.

To get the many benefits possible with this quality product, call in a Gulf Lubrication Engineer. Write, wire, or phone your nearest Gulf office today, or send the coupon below.

GULF INDUSTRIAL LUBRICATION

Gulf Oil Corporation · Gulf Refining Company CA

719 Gulf Building, Pittsburgh 30, Pa.

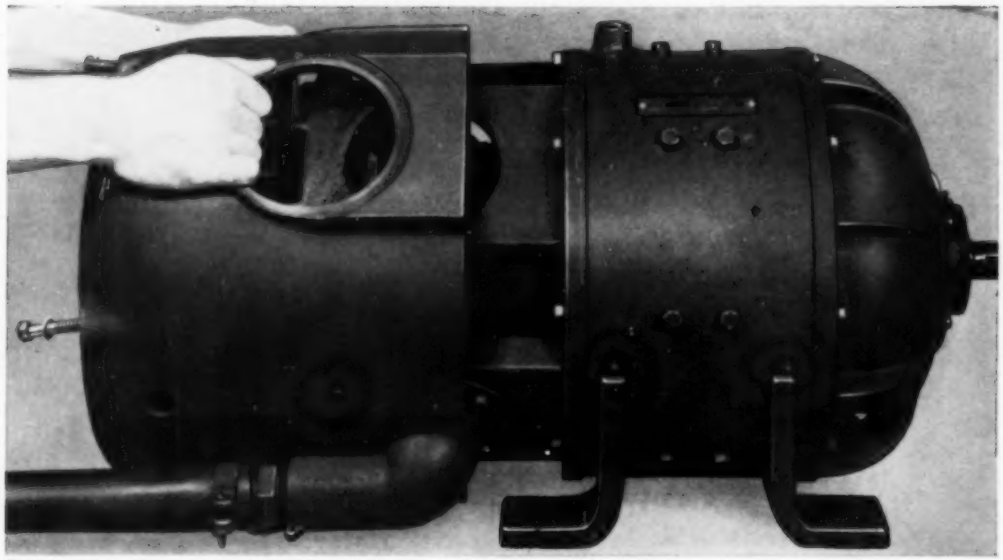
Please send me, without obligation, a copy of your pamphlet "Gulf Mining Machine Lubricant B."

Name .....

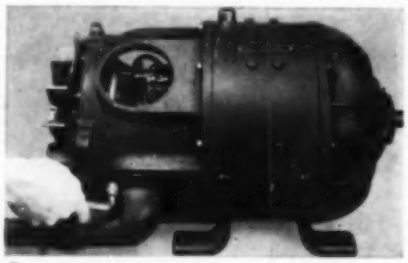
Company .....

Title .....

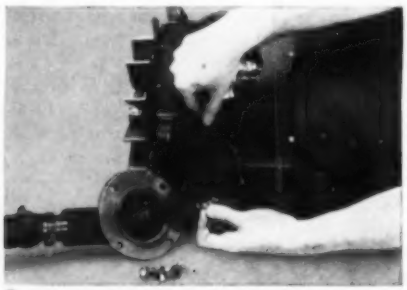
Address .....



1 Remove fan housing and expose cable gland. Housing slides off easily after three bolts are loosened. Cable gland can also be supplied on opposite side of motor from that shown in the standard arrangement above. Gland does not extend beyond motor's normal width.



2 Remove cable gland and expose motor terminals. A few quick turns and the holding bolts are off. For greater ease in making connections, cable gland may be rotated 90 degrees in either direction from position shown, without removing motor from machine, or without making any internal changes.



3 Connect cable to motor terminals. Ample working room, plus generous-length internal leads and convenient terminals, makes this easy. Supplied with motor are 10 feet of multi-conductor neoprene-jacketed cable with ground wire for added safety, plus 10 ft. of 3-ply protective hose.

Easier cable connections—on the job!

New G-E mine motor—with removable cable gland—lets you install or replace cable without dismantling motor, simplifies maintenance!

Newly designed with installation and maintenance in mind, this General Electric d-c mine motor now makes it possible to make cable connections as often as necessary—right on the machine! It's the unusual lead-entry arrangement in the easily-removed cable gland that does the trick. No need to remove endshield, or work through commutator-access openings!

And that's not all! A host of other new features combine to make this mine motor, in ratings from ½ to 50 hp, the way *you* want it—easier to inspect and maintain, longer-lasting, easier to install. Bulletin GEA-5553 tells the whole story. Ask your G-E representative for a copy, or write Sect. 663-17, *General Electric Company, Schenectady 5, New York.*

New **DC Mine Motors**

Explosion-proof, listed by U.S. Bureau of Mines, for any underground use

GENERAL ELECTRIC

663-17

Chalk up another top score for JOY

DUQUESNE LIGHT COMPANY

435 SIXTH AVENUE

PITTSBURGH 19, PENNSYLVANIA

ADDRESS REPLY TO

October 24, 1951

JOY Manufacturing Company
Henry W. Oliver Bldg.
Pittsburgh 22, Pa.

Gentlemen:

We have three JOY Continuous Miners working in our Harwick Mine. All are using Joy Sulmet Cutter Bits in the ripping chains. The three have been in operation for a total of 26 months, during which they have mined 214,806 tons of coal. In this time the total cost of bits used was $3894.00 and we had a cost of $1646.00 for labor and material to sharpen them. We have averaged four to five regrinds per bit.

Thus we have had a bit-cost of $0.018 plus 0.008 for conditioning, making a total cost of $0.026 per ton.

We feel that the performance of Joy Sulmet Bits is excellent, since our seam has a consistent strip of bone about 12" thick and occasional clay veins and sulphur balls.

Very truly yours,

DUQUESNE LIGHT COMPANY

J. H. Truax,
Superintendent



SULMET BITS

In case after case, under all possible seam conditions and in every mining field, JOY Sulmet Tungsten Carbide Bits have consistently cut better, faster and at less cost per ton of coal produced than any other bit on the market. *Let us show you other actual operating records!* JOY Sulmet Bits can be used with any coal cutter, and are available in a wide variety of types developed expressly to meet each individual cutting condition—also in auger and finger bits for coal drills. ● *Switch to Sulmet Bits, and cut your cutting costs.*

Consult a Joy Engineer



WABEL 3979

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



"To E.B. or not to E.B.?"

. . . That, as the late Mr. Shakespeare might have put it, is the $64 question!

"Should I shoot from the *bottom* of the holes with electric blasting caps (E.B.'s), or shoot from the top?" asks the blaster.

"Judging from that Atlas book of machine-gun blasting photos, shooting from the bottom with the Atlas ROCKMASTER® System could give better breakage—more control and less backbreak, too. It's a fact that along with containing the explosives force and keeping it working on the burden, blasters get a reduction of noise and vibration with the ROCKMASTER System.

"Safety? Underground coal miners use more E.B. caps than anyone else. And they *tamp* the dynamite while the caps are in the hole.

"Sure, there are places where you *should* shoot from the top—if you *want* throw or want to *lift* the top out of the way, as in ditching and some tight work. But most mine, quarry and construction men want to break up the rock and pile it for the shovels.

"The Atlas machine-gun camera book is right. ROCKMASTER confinement of explosives energy gets more well-broken rock per dollar, and reduces noise and vibration."

With ordinary blasting: Geysers of wasted gas . . . unnecessary throw



With ROCKMASTER blasting: Explosives gas confined . . . controlled action



ATLAS EXPLOSIVES *"Everything for Blasting"*

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

Cut Maintenance Costs ...with Accessibility Like This!



Coal Washing Pump



ONLY 5 WEARING PARTS

Shaft sleeve, impeller casing, two wear plates. All easy to handle and easy to replace.

EVERYTHING YOU NEED TO REMOVE or adjust when servicing the Allis-Chalmers CW Pump is easy to reach and easy to replace. The packing gland nuts are wide open so you can get a wrench on them. The clear water seal piping is easy to install and the flow is easy to adjust. If you want to remove the rotating element, the casing bolts need only be loosened slightly and pulled out of their slots. Piping is not disturbed.

Longer Wear Between Servicings

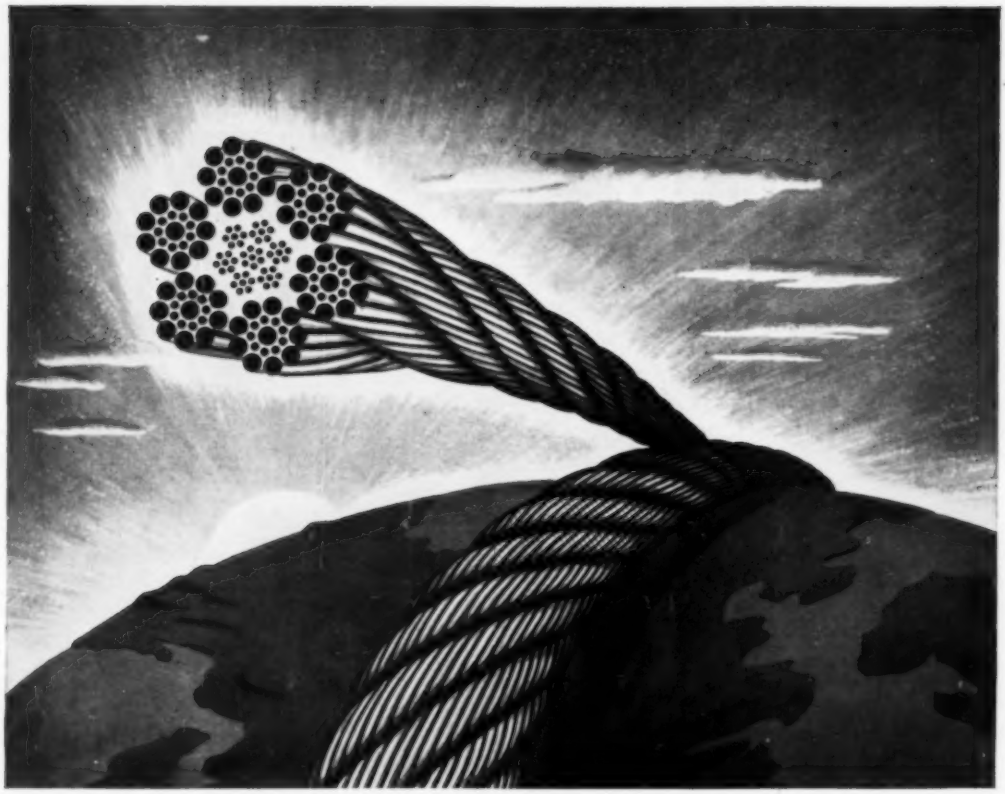
Users report up to four times longer life with Allis-Chalmers CW Pump as compared with standard pumps. Such exceptional life is common because these pumps are made of hard *Allisite* alloy . . . they have thicker sections and heavier parts . . . and they are application engineered by specialists who know how to solve coal washing problems.

Discuss your coal washing equipment problems with an Allis-Chalmers pump engineer. Call your nearby A-C District Office or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 08B6381. A-3521

Allisite is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS





Rope that Sticks With You

We think of the world as a pretty big place, yet one distributor alone has sold enough Bethlehem wire rope to girdle the globe several times. And this total, impressive though it is, represents only a fraction of all the Bethlehem rope sold through the years.

This, we think, is the best possible evidence of a product sound in quality, sound in performance. Bethlehem rope has been approved by a jury of users far too vast to number — men fully qualified to pick and choose. They could, if they wished, buy other makes of rope. But they stick with the Bethlehem brand because it sticks with them.

It gives them every penny's worth of value for the hard cash they spend.

If you yourself are a user of Bethlehem rope, we don't have to tell you much about it. If you aren't, we hope you'll soon try some of this tough, sturdy product. It will do the job you expect it to do . . . and more.

For a great many applications we strongly recommend Form-Set (preformed) wire rope. It's so easy to handle, and it now costs very little more than nonpreformed.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

When you think WIRE ROPE . . . think BETHLEHEM

"Tycol Acylkup 'stays put'... keeps mine equipment rolling... smooths the way for heavier loads"



Absolutely right! Tycol Acylkup stays put . . . keeps mine equipment running in top condition – inside the mine and out.

Tycol Acylkup reduces low-temperature drag . . . retards lubricant leakage at high temperatures . . . permits the handling of more cars per haul.

Tycol Acylkup is firmly resistant to the washing action of water. Its dependable lubricating ability reduces maintenance costs.

Your nearest Tide Water Associated office will give you further information. Call or write today.

TYCOL

INDUSTRIAL LUBRICANTS

Boston • Charlotte, N. C. • Pittsburgh
Philadelphia • Chicago • Detroit
Tulsa • Cleveland • San Francisco

TIDE WATER ASSOCIATED OIL COMPANY

SEND FOR A FREE COPY OF "TIDE WATER ASSOCIATED LUBRICANIA"

PARMANCO HI-SPEED HORIZONTAL DRILL

Completely Re-designed Around a 40 H.P. Engine

Drills a 6-inch Hole in two-thirds the ordinary time



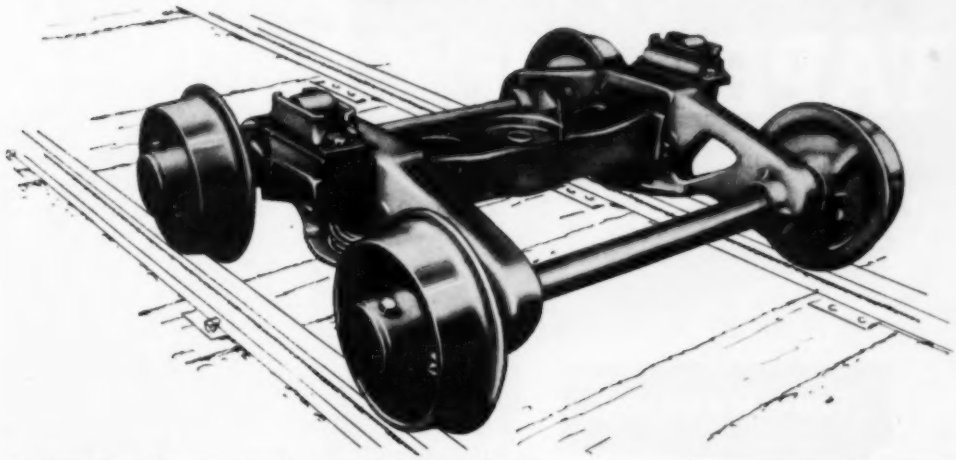


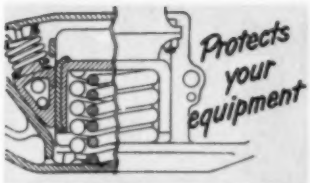
Included in the new design is an auger rack which saves on drilling time. The augers are on the machine as it is moved from hole to hole. Another feature, for faster set up and smoother drilling, is the four individually adjustable leveling jacks. Automotive steering is optional.

This HI-SPEED DRILL is designed for drilling 5-6-8 in. holes to 100 ft. or more. The 40 h.p. engine with four drilling speeds makes possible the reduction of footage time by one third. This new drill, the very latest in design, is equipped with self starter and generator, dual type front wheels, truck type rear axle with hydraulic brakes and traction drive with both forward and reverse. Here is greater speed in retrieving augers and four rotating speeds and reverse for drilling and cleaning the hole. Here is accuracy and mobility. Here is the modern answer to faster, lower-cost drilling.

PARIS MANUFACTURING CO. PARIS ILLINOIS

Specify NATIONAL NC-1 trucks for your large 8-wheel mine cars

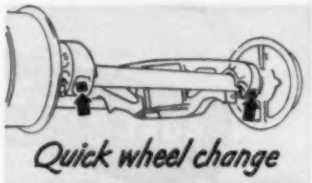




Shock-absorbing system of the NC-1 truck is similar to designs of the American Association of Railroads for full-size freight car trucks. The oscillation control mechanism (see cutaway) floats your loads over the tracks.



Track irregularities are no hindrance to higher speeds for mine cars when they are equipped with National NC-1 trucks. Truck design and large diameter, low stressed, load-carrying springs improve riding qualities.



Removal of bolt at each end of side frame permits quick wheel and axle assembly change. Cuts repair time and costs . . . keeps cars in operation longer. No lengthy tie-ups for wheel and axle changes on a National NC-1 truck.



The NC-1 truck stays square automatically. V-shaped slots over the axles make it impossible for the truck to get out of square without lifting entire weight of the car body and lading—means longer service, less repairs.



National NC-1 truck's large center bearing provides maximum wear life by reducing per-square-inch loading... provides bolster stability. Has easily replaceable centerplate shims and adequate provision for lubrication.



Side frame and bolster are each of one-piece, integrally cast construction similar to the National C-1 trucks used on railroads. Gives maximum strength, minimum weight—has *no welds or rivets to shake loose.* A-2920

For minimum maintenance time and spillage, plus maximum equipment protection—specify National NC-1 trucks on your next 8-wheel mine car order.

NATIONAL Products FOR TRANSPORTATION AND INDUSTRY M&SC Est. 1868

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Cleveland 6, Ohio

WILLISON AUTOMATIC COUPLERS • DRAFT GEARS • NACO STEEL WHEELS

There's only one

TAPER-LOCK

Precision-Grooved

True Running

Easy on—Easy off



TAPER-LOCK bushing grips the shaft for the full length of the bushing — holds sheave with firmness of a shrunk-on fit. No wobble. Taper-Lock runs true!

No flange—no collar—no protruding parts. Flush machine-tool appearance.

Finest grade of close-grained semi-steel, cast in the Dodge foundry.

The grooves, machined on precision equipment, have identical pitch diameters. This insures equal belt tension. Every belt pulls its share of the load!

TAPER-LOCK sheaves are available from distributors' stocks in complete range of sizes in A, B, C and D grooves.

DODGE SEALED-LIFE BELTS have special protection for tension members, insuring longer belt life. Perfectly matched to TAPER-LOCK sheaves.

DODGE MANUFACTURING CORPORATION, 3000 Union Street, Mishawaka, Ind.



DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Equipment" in your classified phone book.

FIRST IN POWER TRANSMISSION MACHINERY!



V-BELTS AND TAPER-LOCK SHEAVES



DODGE TIMKEN PILLOW BLOCKS



ROLLING GRIP AND DIAMOND D CLUTCHES



SOLID STEEL CONVEYOR PULLEYS

longer life for CRUSHERS!

coated AC-DC

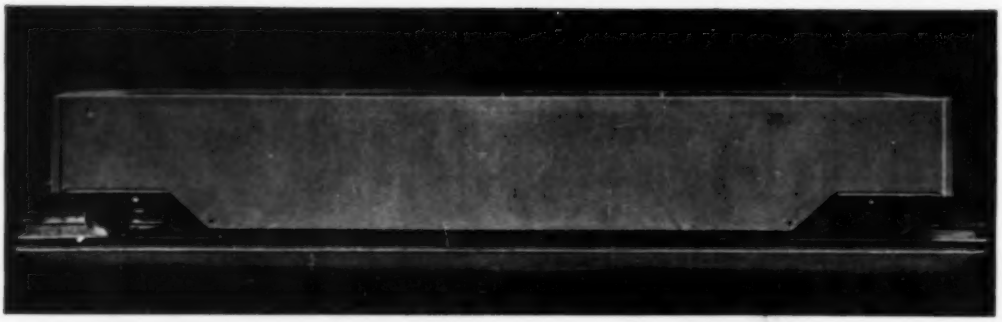
Less down-time . . . less welding time . . . more production . . . more uniform aggregates—at lower cost! Coated AC-DC STOODITE gives you all that!

Compare total crusher maintenance cost, not just the first cost of the electrode you use. AC-DC STOODITE costs more than many rods, *BUT it's cheap in view of the tonnage produced.* Your welder will like the smooth arc, the speed and the ease with which he can lay STOODITE down.

Test AC-DC STOODITE . . . apply it on new crushers—or rebuild worn crushers and hard-face. There are 600 Stoody dealers in the United States and Canada ready to serve you.

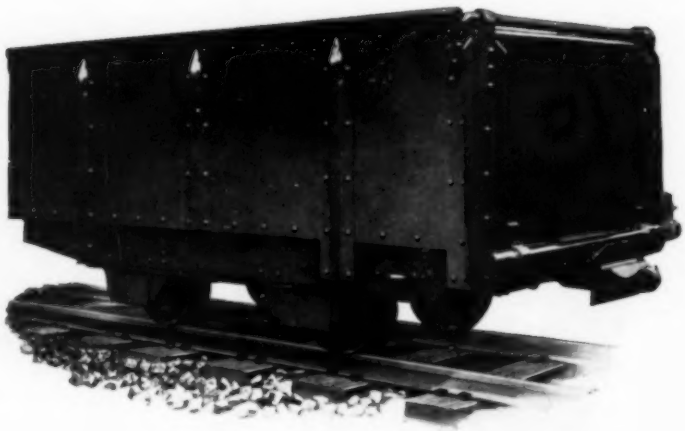
STOODY COMPANY
11943 E. SLAUSON AVE., WHITTIER, CALIF.

STOODITE



Meet These Members

OF OUR MINE CAR FAMILY



Not much alike, are they? Relatives, but only because they're both members of the Bethlehem family. They are complete opposites in looks, size, and the type of work they do.

That long, lean, streamlined job is a regular giant of a car. It's for use in bituminous mines and stands up easily under loads of 17 tons. With its cast-steel, high-speed trucks, roller bearings, forged wheels, and rugged body, it's built for the king-size chores in high-production systems.

The smaller car is a type used frequently by anthracite mines. All-steel, and as sturdy as they come. It's a high-side riveted model with short wheelbase. Very compact and easy to maneuver in close quarters.

The cars shown here are but two of the many kinds that Bethlehem is equipped to build. Whatever your needs may be, always feel free to talk them over with us. Our engineers will gladly co-operate in matters involving design and construction.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

Practical Assistance



Whether it's burrs in a dog's coat, or *lubrication* snarls in a mining operation . . . there's no substitute for practical assistance when the going gets tough.

And ***PRACTICAL TECHNICAL ASSISTANCE*** is a Cities Service specialty.

Cities Service Lubrication Engineers can offer every mining operation practical assistance that will mean dollars, man-hours and equipment saved. They're specialists in the industry's most effective lubricating practices. What's more, they offer the most complete line of quality lubricants.

BUT CHECK FOR YOURSELF:

✓ Check on the high quality of all Cities Service lubricants. Ask your purchasing experts, or critical users. Or better still, test them on the job.

✓ Check the *complete* Cities Service Line for the correct lubricant for every need. Deliveries are sure, quick, accurate and dependable.

✓ And finally, discuss your problems with a Cities Service Lubrication Engineer . . . he's probably solved many like them for other mining operations. Write or phone CITIES SERVICE OIL COMPANY, Dept. A9, Sixty Wall Tower, New York City 5 . . . or get in touch with the office nearest you.

CITIES SERVICE



BUCYRUS-ERIE
EXTRA VALUES MEAN

Dependable High Output

Big, dependable yardages are "standard equipment" for Bucyrus-Erie excavators, as owners and operators the world over will testify. The superior performance records of Bucyrus-Erie result from fast, smooth operating cycles and on-the-job reliability for peak output every shift . . . *plus* the extra values of soundly engineered design and durable construction available only to Bucyrus-Erie as a result of its unmatched experience in the construction of quality excavating machinery.

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BUCYRUS ERIE

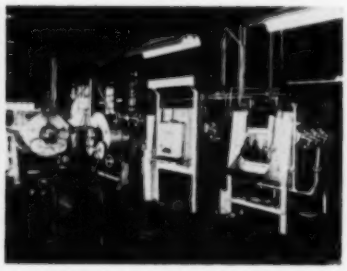
SOUTH MILWAUKEE, WISCONSIN



BACKSTAGE at BOWDIL...

... a glimpse behind the scenes to show you *WHY* Bowdil Products enjoy a reputation as the standard of the coal mining industry.





Latest type tempering, tool-hardening and carburizing furnaces give Bowdil products the right hardness, tensile strength and toughness. Every Bowdil Bit receives the most up-to-date heat treatment . . . for example, natural gas from our mains is first purified by a special generator, and another maintains constantly uniform temperature of quenching oil.



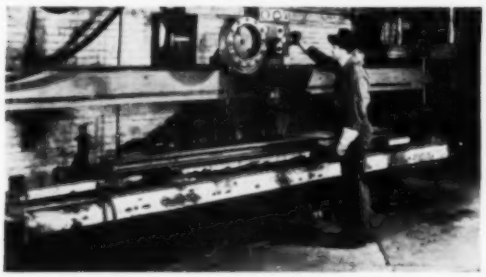
product performance depends on proper heat treating



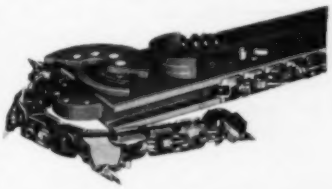
This new grinder, mounted on a floating base in our plant, assures accuracy to .0001" on the parts of Bowdil Chain that take the greatest abuse. Such attention to precision means longer life, trouble free service—results directly in power savings and less down-time for your operation.



our investment in precision pays you dividends

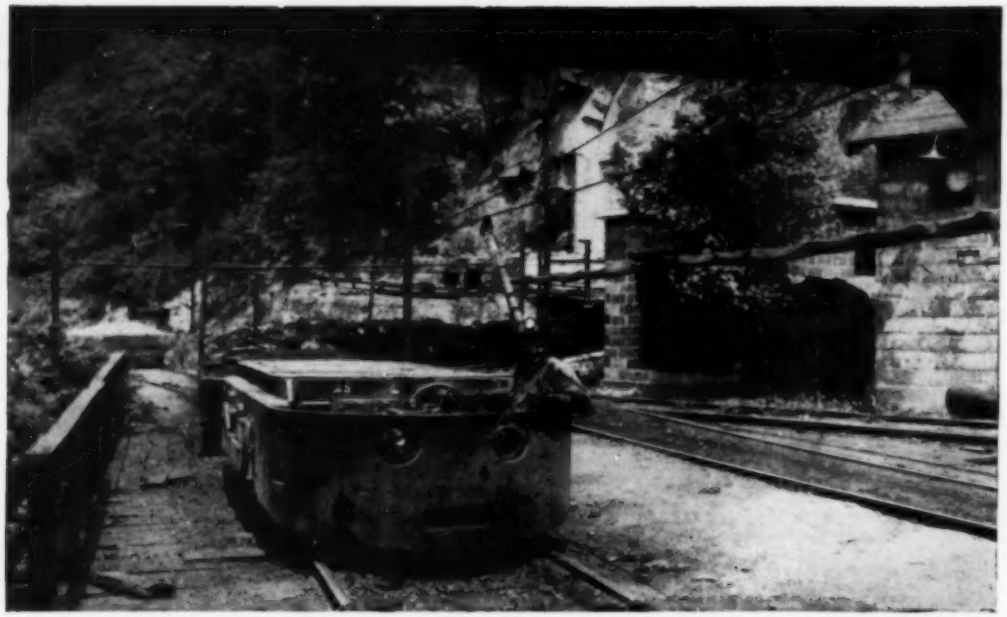


All-welded construction of Bowdil Bars has proved them superior in actual tests made by exerting measured pressure between 3 foot centers . . 4" thick conventional bars tested will bend with 25 to 35 tons pressure—3" thick Bowdil Bars will bend with 60 to 70 tons pressure.



modern welding is your assurance of product strength and durability

The BOWDIL CO. CANTON, OHIO



This 13-ton, 48-inch gage G-E mine locomotive at Ames Mining Company, Fayette, W. Va., is one model in the complete G-E line of mine haulage equipment: trolley-type, cable-reel, and storage battery locomotives; shuttle cars; and trammers.

"EASY TO HANDLE... PLENTY OF PULL"

Says Mr. Paul Morton, Superintendent, Ames Mining Co., of versatile G-E 13-ton mine locomotive

Averaging 100 tons per load, the 13-ton G-E mine locomotive operated by Ames Mining Company, Fayette, W. Va., makes as many as fifteen trips per day. Added to this schedule are such duties as shunting, spotting cars at the dumper, and returning empties for reloading. Ames personnel have declared the G-E locomotive "easy to handle with plenty of pull." Top availability, quick, easy maintenance and long periods between overhauls have backed up this peak performance with real savings.

You can count on the same efficient, money-saving performance from the General Electric mine locomotive that's right for your job. Tough, carefully engineered construction gives them staying power, cuts down maintenance expense. Smooth pickup starts big loads, and there's plenty of power for the haul. Your nearby General Electric representative can show you how the right G-E mine locomotive will bring the loads out faster and save you money. ***General Electric Company, Schenectady 5, New York.***

You can put your confidence in—

GENERAL ELECTRIC

12-1

How good are you at selecting Wire Rope?

The right choice may save you 25% to 50%

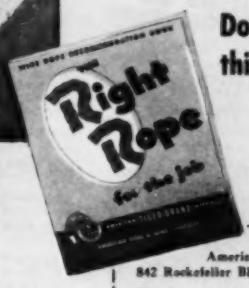


● For every job, there are a number of possible choices of wire rope — but there is usually one best choice. *The wrong choice may cut your wire rope service in half.*

Our new book, "The Right Rope for the Job" gives a complete listing of the correct rope to use for each application in a wide variety of industries. This information, prepared by experienced wire rope engineers,can definitely help you reduce your wire rope costs.

If your particular conditions are not covered, the Tiger Brand Wire Rope Specialist in your area will gladly help you determine the best ropes for your particular needs. It's to your advantage and ours, too, that you get the Tiger Brand Rope that will give you the best service. Send the coupon for a copy of the book and check your choice of ropes.

In the period ahead you will want the best rope you can get—and that's American Tiger Brand.



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UNITED STATES STEEL

Yardley PLASTIC PIPE for water or waste disposal systems

Whatever the need . . . for cold water or corrosive liquids, suction or discharge . . . there's a Yardley Plastic Pipe for the job.

Made from rigid or flexible light-weight material. Acid and alkali resistant. Won't rot, rust or corrode. Produced in a full range of pipe and tubing sizes, ½" through 6". Complete line of standard fittings and adapters. Easier to install, more economical to handle.

Send for chemical resistance charts.



M-6 with cement-type sleeve coupling.



M-2 flexible type.



M-6-T/C with male adapter and threaded coupling added.



M-1 with insert adapter attached

YARDLEY PLASTICS CO.

142 Parsons Ave. • ADams 9315

Columbus 15, Ohio

YARDLEY M-1 and M-2 FLEXIBLE PIPE SPECIFICATIONS

PIPE SIZE	NOMINAL O. D.	NOMINAL I. D.	CALCULATED B. P. P. S. I.	APPROXIMATE WT. PER FT.	NORMAL SHIPPING LENGTHS
½"	.820	.620	540#	.092	400' Coils
¾"	1.080	.840	350#	.141	400' Coils
1"	1.340	1.100	200#	.179	300' Coils
1¼"	1.660	1.360	200#	.263	300' Coils
1½"	1.900	1.610	200#	.357	250' Coils
2"	2.375	2.067	170#	.434	200' Coils
3"	3.500	3.068	165#	.899	100' Coils
4"	4.500	4.026	150#	1.220	25' Straight
6"	6.675	6.065	115#	2.400	25' Straight

YARDLEY M-6 AND M-6-T/C RIGID PIPE SPECIFICATIONS

PIPE SIZE	APPROXIMATE WT. PER FT.	NOMINAL I. D.	NOMINAL O. D.	CALCULATED BURST PRESSURE P.S.I. AT 80° F.
½"	.053	.476	.600	700
¾"	.080	.715	.855	625
1"	.138	.970	1.140	550
1¼"	.20	1.230	1.420	525
1½"	.32	1.510	1.730	490
2"	.45	2.00	2.250	400
3"	.555	3.000	3.250	375
4"	.880	4.000	4.300	342
6"	1.940	6.000	6.440	335

M-6 and M-6-T/C recommended for working pressures up to 20% of calculated bursting pressures where temperatures do not exceed 125°. For M-1 and M-2 working pressures, use 60% of calculated burst.

See them in action!



Goodman TRACTOR TREAD LOADERS

Mine performance is the strongest evidence Goodman can offer of the ability of its tractor tread loaders to produce high tonnages. Here are some of the reasons why these loaders rate so highly:

Type 660 Loader

...Swinging loading head — permits 17 foot clean-up width with only forward and backward movement of the machine. Posting can be close to the face.

...Swinging discharge end—can be swung 40° to either side and raised or lowered to shuttle car height.

...Loading efficiency—powerful digging ability in tight coal, excellent clean-up, action of gathering arms and chains is smooth and continuous.

...Safety for operator—unobstructed vision of all movements of both loading and discharge ends, all movements secured through conveniently grouped finger tip hydraulic controls.

...Sound design—construction is rugged throughout with convenient accessibility to working parts for inspection or repair.

Before you decide on any...see Goodman loaders in action. A Goodman sales engineer will be glad to arrange a mine visit.

GOODMAN TRACTOR TREAD LOADERS

Type 665 – 43" over-all in height with adequate ground clearance for soft bottom. Suited for discharge into large shuttle cars.

Type 660 – 22" coal line height with an over-all height of 31½".

Type 860 – for very low coal. Its over-all height is 26½"; its coal line height only 17".

Goodman MANUFACTURING COMPANY

HALSTED STREET at 48th • CHICAGO 9, ILLINOIS

CUTTING MACHINES • CONVEYORS • LOADERS • SHUTTLE CARS • LOCOMOTIVES

CARDOX

NON-EXPLOSIVE MINING METHODS

THESE 279 MINES

Are Now Using

EITHER CARDOX OR AIRDOX MINING METHODS

WEST VIRGINIA

Algoma Coal and Coke Company
American Coal Company (3)
Amos Mining Company (3)
Anchor Coal Company
Brule Smokeless Coal Company (2)
Carbon Fuel Company
Clear Creek Coal Company
Crozer Coal and Coke Company (5)
Eastern Gas & Fuel Associates
Elk Lick Coal Company (2)
Gay Mining Company (2)
Dorothy Gordon Coal Company
Harris Coal Company
Hoylman Coal Company
Hutchinson Coal Company (2)
Island Creek Coal Company (2)
Imperial Smokeless Coal Company
J. Jarrell
Jacob's Fork Pocahontas Coal Company
Johnstown Coal & Coke Company (2)
Lamar Collieries Company
F. M. A. Leach
Logan County Coal Corporation
Lorado Coal Mining Company
Mariana Smokeless Coal Company
Nassau Coal Company
National Mines Corporation (3)
New River Company
Nicholas Webster Coal Corporation
Pardee and Curtin Lumber Company (4)
Pecks Run Coal Company
Peters Creek Coal Company
Pond Creek Pocahontas Coal Company
Premier Pocahontas Collieries
Princess Dorothy Coal Company
Raine Lumber and Coal Company (2)
Raleigh-Wyoming Mining Company
Red Jacket Coal Company
Red Parrot Coal Company
Richwood Sewell Coal Company
Ridgeview Coal Company (2)
Rupert Smokeless Coal Company
Sycamore Coal Company
Tioga Coal Corporation
Truax-Traer Coal Company
United Pocahontas Coal Company
U. S. Eagle Coal Company (3)
Warner Collieries
Webb Coal Mining Company
West Gulf Collieries
West Virginia Coal & Coke Corporation
Weyanoke Coal and Coke Company
Winding Gulf Collieries (2)
Wood Coal Company
Wyatt Coal Company

VIRGINIA

Blackwood Fuel Company, Inc.
Clinchfield Coal Corporation (2)
Coal Processing Corporation (2)
Jewell Ridge Coal Corporation
Page Pocahontas Coal Corporation (2)
Sycamore Coal Corporation
Virginia Harlan Coal Company

KENTUCKY

Bell & Zoller Coal & Mining Company (2)
Big Jim Coal Company
Black Star Coal Corporation
Blue Bird Mining Company (2)
Blue Diamond Coal Company
Cinderella Coal Corporation
Citation Coal Company (2)
Columbus Mining Company
Correale Coal Mining Corporation
Creech Coal Company
W. G. Duncan Coal Company, Inc.
Eblen Coal Company
Elkhorn Coal Company
Elkhorn Jellico Coal Company (2)
Fourseam Coal Corporation
Harvey Coal Company
Jewell Ridge Coal Corporation (2)
Kentland Elkhorn Coal Company
Knott Coal Corporation
Liberty Elkhorn Coal Company
Marlowe Coal Company
Mary Gail Coal Company
New Big Creek Mining Company (The)
Norton Coal Corporation
Smith Coal Company
Stephens Elkhorn Fuel Company
Stoker Coal Company (2)
West Kentucky Coal Company

TENNESSEE

Block Coal & Coke Company
Straight Fork Coal Company

PENNSYLVANIA

Adamsburg Coal Company
Beaver Run Coal Company
The Berwind-White Coal Mining Company
Butler Consolidated Coal Company
Cambria Clearfield Mining Company
Charles E. Campbell
Culmerville Coal Company (3)
Ebensburg Coal Company
Johnstown Coal & Coke Company (2)
Marca Coal Company (5)
Marriedale Coal Mining Company
Pittsburgh Coal Company
Republic Steel Company
S. & U. Coal Company
J. L. Sager Coal Company
Springfield Coal Corporation
Wallwork Coal Company (2)
Westmoreland Coal Company

CARDOX CORPORATION

ANNUAL *Roll Call*

OHIO

Columbia Southern Chemical Corporation
The Farm Bureau Cooperative Association Inc.
Gem Coal Company
Hanna Coal Company of Ohio.....(2)
Lorain Coal & Dock Company.....(2)
The David Z. Norton Company
Rail & River Coal Company
Warner Collieries Company.....(2)

ILLINOIS

Bell & Zoller Coal & Mining Company.....(4)
Blue Bird Coal Company.....(2)
Carmac Coal Company
Chicago, Wilmington & Franklin Coal Company.....(2)
Cutler Coal Company
Franklin County Coal Corporation
Freeman Coal Mining Corporation.....(2)
Mid-Continent Coal Corporation
Moffat Coal Company
Edward Mohn & Son
Old Ben Coal Corporation.....(5)
Peabody Coal Company.....(6)
Perry Coal Company
Pschirrer & Sons Coal Company
Sahara Coal Company.....(3)
Schull-Moake Coal Corporation
Truax-Traer Coal Company
Union Colliery Company
Wilkins Coal Company

INDIANA

Enoco Collieries Company
Ingle Coal Corporation
Linton Summitt Coal Company
Pandora Coal Corporation
Princeton Mining Company
Pyramid Coal Corporation
Snow Hill Coal Corporation.....(2)
Standard Coal Company
Templeton Coal Company
Viking Coal Corporation.....(2)
Wolf-Koenig Corporation

OKLAHOMA

Buck Creek Mining Company
Davis & Swindle
Premium Smokeless Coal Company
Reliance Smokeless Coal Company

COLORADO

Arrowhead Coal Company.....(2)
Bear Coal Company
Black Diamond Fuel Company
Boulder Valley Coal Company
Canon Black Diamond Coal Company
Canon Monarch Coal Company.....(2)
Canon National Coal Company
Centennial Coal Company
Chandler Coal Company.....(2)
Clayton Coal Company.....(2)
Colorado Fuel & Iron Corporation
Colowyo Coal Company
Consolidated Coal & Coke Company
W. D. Corley, Jr.
Domestic Coal Company
Double Dick Coal Company
Dry Creek Coal Company
Graden Coal Company
Griffith Coal Mining Company.....(2)
Imperial Coal Company
Jenkins & Mathis Coal Company
Juanita Coal & Coke Company
Liley & Merline
Louisville Lafayette Coal Company
McNeil Coal Corporation
William E. Russell Coal Company
Taylor Coal Company
Tomahawk Coal Company.....(2)
Utah Fuel Company
Victor-American Fuel Company
Western Colorado Coal Company

MONTANA

Bair-Collins Coal Company
Brophy Coal Company
Jeffries Coal Company
Johnson Coal Company
Northern Coal Company
Sheridan-Wyoming Coal Company
Transfer Mine
Western Coal Company

WYOMING

Burnell Coal Company.....(2)
Colony Coal Company.....(2)
Sheridan-Wyoming Coal Company
Storm King Coal Company

UTAH

American Gilsonite Company
Peerless Sales Company
Hi-Heat Coal Company

NEW MEXICO

St. Louis, Rocky Mountain & Pacific Company

ARKANSAS

Smokeless Coal Company

CANADA

Century Coal Limited
Lethbridge Collieries, Limited.....(2)
The Monarch Coal Mining Company, Limited
Red Deer Valley Coal Company, Limited
West Canadian Collieries, Ltd.....(2)

*INDICATES NUMBER OF MINES USING THE NON-EXPLOSIVE MINING METHOD

CARDOX
HARDSOCG
DRILLING EQUIPMENT
Complete line of drilling equipment designed to give you the maximum in drilling efficiency.

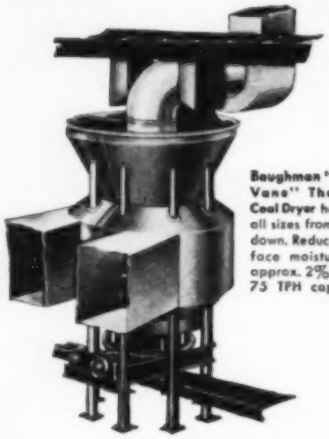
• BELL BUILDING • CHICAGO 1, ILLINOIS •

BEHIND THE NAME

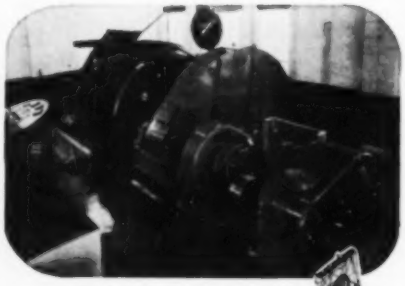
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IS 80 YEARS OF "*SPECIALIZED*" MANUFACTURING OF

RELIABLE MINE EQUIPMENT



Baughman "Verti-Vane" Thermal Coal Dryer handles all sizes from 1¼" down. Reduces surface moisture to approx. 2%. 15 to 75 TPH capacity.



Holmes Advance Design Hoists feature the latest and most complete control equipment. Ask for complete information.

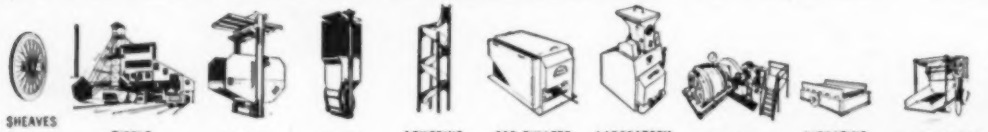
Increased mine production and efficiency—from the pit or shaft to the loading dock—are found today in hundreds of mines because of equipment pioneered by Holmes. Use this specialized experience to obtain the most advanced design, the best of materials and the latest methods of manufacture. Take advantage of this creative engineering and long-standing reputation for sturdy construction that assures efficient, dependable performance at a lower over-all cost. Call on a Holmes Mine Equipment Engineer for consultation in the planning and development of your requirements. There is no obligation.

ROBERT HOLMES & BROS., INC.
DANVILLE, ILLINOIS
Dept. A-12



Ask for new Catalog Literature containing vital construction and installation information on The Baughman Verti-Vane dryer—Bulletin No. 101.

Peabody Coal Company's new mine No. 17 at Pana, Illinois, is equipped with Holmes Hoisting Equipment.

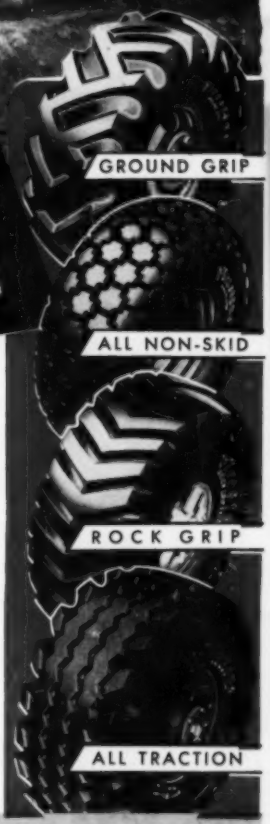


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MAKING TIME or MARKING TIME-
The Difference is YOUR PROFIT



Firestone
OFF-THE-HIGHWAY TIRES
MAKE THE DIFFERENCE



YOUR profit on the job is the difference between going through and going down. And the tires that make those profits possible are the tires that develop the greatest traction and have the strength to take it.

Firestone Tires give you extra service at no extra cost because they are built with extra strong Gum-Dipped rayon cord bodies . . . built with four extra impact plies to protect the bodies . . . built with double-thick, snag-resistant sidewalls . . . built with extra heavy treads engineered to fit the job. Firestone Tires not only run longer, but they always give maximum traction to cut your loading time and increase the operating efficiency of your equipment.

See your nearby Firestone Dealer or Store. Let them show you how Firestone Off-The-Highway Tires will cut your downtime and increase your profits.

WHEN YOU BUY NEW EQUIPMENT OR REPLACEMENT TIRES, SPECIFY FIRESTONE

Enjoy the Voice of Firestone on radio or television every Monday evening over NBC

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on the Job

Enjoy the satisfaction of knowing that you, too, have taken every safety precaution on your blasting jobs. You can remove many a hazard if you *"Hook Up and Detonate with PRIMACORD."*

Primacord cannot be set off by friction, sparks or ordinary shock — it requires a blasting cap. It is not affected by stray currents.

Safety is not the only reason you need Primacord. Its use means faster, easier loading; positive firing of every cartridge in the hole; better fragmentation in planned shots. It helps to keep your shovels digging with pay dirt in every load.

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Coal Age

JANUARY, 1952

IVAN A. GIVEN, EDITOR

New Contender

WITH ONE FULL-SCALE TEST now under way and others using foreign-type mining and loading machines planned for the near future, it now looks like semi-longwall has a good chance of giving the simple, time-tested and old-reliable room-and-pillar system some competition in the United States in the relatively near future, particularly in the thinner seams. Though the experiments now being conducted or planned are based, as noted, on foreign designs of equipment, the continuous machines already in service or under development in the United States lend themselves equally well to semi-longwall operation.

True longwall—and next to it, semi-longwall—theoretically offer the closest approach to complete extraction with maximum continuity, and thus should result in the highest efficiency. The rub has been support and control of the roof. In the main, as in England, as indicated in the article on the British cutter-loader elsewhere in this issue, the problem has been met by the construction of packwalls to provide the necessary support and control subsidence. To keep down the cost, foreign operators have devoted major attention to mechanical, hydraulic and pneumatic stowing, and have made substantial progress toward cheapening packwall cost. Recent operating experience, particularly in Germany, also indicates that with new types of mechanical supports, which also are readily movable, packwalls are not necessary in many instances to get good support and control at the face. And even with packwalls, should they prove necessary, the cost in relation to the benefits in increased productivity might not be too much more than the cost of support by conventional timbering, which is a not insignificant item with conventional mining at today's rates for labor and material.

If, as the evidence now indicates, the roof support and control problem can be licked at a reasonable cost, semi-longwall can offer a number of inherent advantages—greater operating continuity, maximum concentration, maximum extraction and so on—all tending to raise productive efficiency. With the new machines now available—and which readily lend themselves to this type of mining—United States coal men now have an opportunity to really explore the possibilities of semi-longwall. The result could well be a much closer approach to that goal of automatic mining underground that will guarantee the lowest-possible cost.

How Far?

CAN THE MAXIMUM in safety be attained with the maximum in efficiency? There is general agreement that the two are natural parallels. However, even though the validity of the principle is accepted, it still meets opposition—conscious or unconcious—in practice in all-too-many instances in spite of mounting evidence that it really pays off.

The Island Creek Coal Co., for instance—one of the latest coal companies to report outstanding safety records to the National Coal Association—has mined over 10,000,000 tons since its last fatality. And Island Creek, like the many others that have reported exceptional records, has long been high in the list of efficient producers. In November, also, the anthracite region as a whole came close to reaching the irreducible minimum in fatalities. What that irreducible minimum is has not been set out for many other segments of the coal-mining industry, but the records of the safety leaders in both bituminous and anthracite indicate not only that it can be reached but that reaching it means high tons per man.

ELECTRIC POWER—Big and Busy Coal User . . . And Still Growing



Coal's Blue Yonder

Look ahead at coal. Here's the prospect . . .

Now, in 1952—570,000,000 tons of bituminous
44,000,000 tons of anthracite

Beyond 1952—Old customers using more coal
New energy users turning to coal

LOTS OF BLUE YONDER—that's the outlook for coal in the years ahead.

Coal's lush prospects—for 1952 and for the following years as well—are solidly built on the following:

1. Growing demand for energy, far beyond the ability of competing fuels to satisfy.

2. Bigger industrial markets for coal, including not only coal's tried and true customers but many new industries.

3. The near-exhaustion of sources for hydro power.

4. Increasing prices for oil and natural gas.

5. Abundant reserves of coal.

6. A stabilized coal industry—strong financially, strong in its labor relations, strong in modern plant and equipment, and strong in capacity to produce.

Granted, there are some "If's."

The chief ones are: (1) a general depression, which now seems unlikely; (2) a long strike which, because of better bargaining machinery and improved labor relations, seems only a remote possibility; and (3) an upsurge in coal's cost structure. With coal men as skilled and ingenious as they have proved themselves, this last "If" isn't likely to be troublesome.

With the "If's" out of the way, here's how coal's outlook shapes up:

Coal and the Utilities

COAL'S BIGGEST CUSTOMER soon may be the electric utilities.

Output by the utilities soared from 130,336,050,000 kw-hr in 1939 to 325,000,000,000 in 1950—up 150%. In the same period, the utilities increased their coal use from 46,223,000 to 88,000,000 tons—up 90%.

The utility-fuel tide turned back in coal's favor in 1951. In the first 8 mo of 1951, electric output ran 13% ahead of 1950; coal use by the utilities, 19% above 1950. By the end of 1951, the utilities had used close to 105,000,000 tons of coal. In 1952, they probably will burn an additional 4,000,000 to 5,000,000 tons.

In the next few years the utilities hope to raise their generating capacity some 45% above the 68,000,000,000-kw figure of January, 1951, and to boost their output to 447,000,000,000 kw-hr by 1954. Part of the picture is revealed in a Federal Power Commission list of new steam-electric plants scheduled, as of March 31, 1951, for completion from 1951 through 1954. Region by region, the list shows the following plans.

	New Capacity (Kilowatts)
Region I—Northeast	4,799,875
Region II—East Central .	4,272,750
Region III—Southeast ..	4,903,250
Region IV—North Central	2,459,750
Region V—South Central	1,960,250
Region VI—West Central	722,500
Region VII—Northwest .	180,000
Region VIII—Southwest .	1,280,000

Spot a few samples from the FPC list and other sources, and you get an even more realistic picture of what's going on among the utilities:

Scranton Electric Co., Scranton, Pa.—A 44,000-kw unit burning pulverized anthracite; completion, 1953.

Pennsylvania Power & Light Co.—Two units at Sudbury, Pa., totaling 225,000 kw, for completion in 1951 and 1953; and a 125,000-kw unit at Martins Creek, Pa., for completion in 1954.

Philadelphia Electric Co.—A 150,000-kw unit at Phoenixville, Pa., for completion in 1953; three units totaling 400,000 kw at Philadelphia, for completion in 1952-54.

Commonwealth Edison Co. — Three 150,000-kw units at Stickney, Ill., for completion in 1951-53, burning eventually 1,500 tpd of coal; and three other plants totaling 470,000 kw for completion in 1952-54.

Alabama Power Co. — Five plants that will boost total output to 1½ times prewar generation, to be completed by 1954. One unit, a 250,000-kw plant at Mobile, Ala., will use 800,000 tons per year of coal and later will be enlarged to 1,000,000-kw capacity.

Georgia Power Co. — Seven large-scale additions to capacity.

Virginia Electric & Power Co.—Eight projects under construction or contemplated.

Detroit Edison Co.—Four plants totaling over 600,000 kw for completion in 1951-54.

Coal and Metals

MAKING A POUND OF ALUMINUM takes from 8 to 10 kw-hr of electric power.

Before long, coal may be producing a big chunk of the power the growing aluminum industry will need. That's because:

1. The aluminum industry is set for big growth—and fast.

2. Even now, hydro stations, especially in the Pacific Northwest, where much of the Nation's

COAL'S BLUE YONDER . . .



Aluminum Co. of America

Aluminum, running out of hydro sources, turns to fuel-made power while . . .



Titanium joins other "growth" industries seeking big blocks of power.

aluminum capacity is clustered, can't produce all the power that's needed. And we're running out of new sites for hydro power.

3. There's a movement afoot to build new steam plants in the Pacific Northwest to ease the drain on hydro plants.

4. Recent shortages of rainfall have shown the folly of depending on hydro for aluminum.

5. Aluminum men are turning to fuel-made power for their new plants.

Here's the growth outlook in aluminum:

In 1951, the industry enlarged output by 17% and took the first steps in a $500,000,000 growth program that will bring in an added 1,300,000,000 lb of annual production by 1953 and push total capacity to 2,739,500,000 lb. The government already has approved this program. On top of that, the industry now plans another 500,000,000 lb of capacity.

New capacity will be brought in by adding to existing plants and building four new ones. Hydro power for much of this growth simply doesn't exist. That's why all except one of the new plants—Alcoa's plant at Wenatchee, Wash.—will use fuel-made power. In fact, even the Wenatchee plant may use fuel-made power if Congress enacts HR 4963. This bill would authorize three 100,000-kw steam plants and five gas-turbine plants in the Pacific Northwest.

What does all this mean for coal? It means:

1. With a trend toward fuel-made power for aluminum and with steam stations moving into the Northwest, the coal industry there will get a shot in the arm.

2. Though the new aluminum plants at Chalmette, La., and Corpus Christi, Tex., will use power made from natural gas, the Rockdale, Tex., plant will be the first aluminum power installation burning solid fuel—7,000 tpd of lignite from new strip mines close by.

3. Government officials are concerned about bulk use of natural gas and governors in gas-producing states are uneasy about shipping gas beyond their borders for gross energy uses. If they have their way, there'll be less gas for power generation.

In titanium, the new wonder metal, the boom is not far off. It's strong, light and resistant to heat and corrosion—an ideal material for light infantry weapons, planes, ships and turbine blades.

The titanium boom will create demand for big blocks of electric power. Producers in the West already have contracted for 151,000,000 kw-hr of hydro power. Others will follow. But titanium will come up against the same roadblock that aluminum has stumbled over—shortage of hydro power. Steam power, much of it made from coal, will be the answer.

For steel, coal's tried and true customer, the outlook is strong. Steel was running at 104% of capacity at the end of November, 1951. That meant 2,079,000 tons of ingots and castings per week—an annual rate of 108,108,000 tons. That weekly figure was 32% above the figure for the same week in 1950. Total output for 1951 was over 104,000,000 tons.

Steel now is shooting for new capacity of 20,000,000 tons per year. The industry has been asked to produce an extra 1,000,000 tons in the first quarter of 1952; an extra 2,000,000 in the second quarter. Annual production targets for the years ahead look like this:

	Tons of Steel
1952	113,200,000
1953	121,500,000
1954	125,500,000
1955	130,000,000

Making a ton of steel from iron ore takes about 1¼ tons of coal. Figure it out for yourself. There'll be a big increase in steel's coal needs in the years ahead. For 1952, some 5,000,000 to 6,000,000 additional tons of coking coal alone will be needed.

Chemicals, Paper, Cement

CHEMICALS AND PAPER, including printing, add up to a market for well over 35,000,000 tons of coal per year. Both are growing fast.

Between 1939 and 1947, the chemical industry nearly doubled its use of coal from 10,000,000 to almost 20,000,000 tons per year. Since World War II, it has grown faster than any other major industry. In June, 1950, the Federal Reserve Board's index of chemical production stood at 261; in June, 1951, at 303.

Chemicals, the experts say, are still in their infancy.

Take phosphates, for instance. Demand is booming for commercial fertilizers, as well as for phosphoric acid and its derivatives—detergents, for instance. Reflecting increased demand, chemical companies have enlarged their plants, especially in the West, where phosphate production has been moving upward.

Reduction of raw phosphate takes a lot of electric power. In 1949, for example, Westvaco Chemical Co. installed a third electric furnace at Pocatello, Idaho, bringing total capacity there to 41,500 kw. Shortly thereafter, Victor Chemical Co. announced plans for a new electric furnace at Silverbow, Mont. These, and others like them, are setting up a new electric-power market for coal producers to shoot at, aside from carbon necessary for electrodes and in the reduction process itself.

The defense effort has put a tight squeeze on toluene, benzene and other chemicals. Along this line, Union Carbide & Carbon Co. is building an $11,000,000 chemical plant at Institute, W. Va. Coal will be the major raw material. Likewise, the Department of the Interior has a tentative proposal in hand for a plant that would hydrogenate Illinois coal mainly to produce chemicals. Federal experts contend that a hydrogenation plant producing 30,000 bbl per day of liquid fuels would increase the supply of benzene by 20%, boost phenol by about 11% and provide quantities of toluene, xylene, motor gasoline and LPG. Such a plant would use about 9,000 tpd of coal.

The paper and printing industry in 1947 used 15,246,000 tons of coal, against only 10,781,000 tons in 1939. That's a measure of the industry's growth and a forecast of what's ahead. Typical of many plants built since the war and planned for the immediate future is a projected $55,000,000 plant near Chattanooga, Tenn. The plant would turn out 125,000 tons per year of newsprint plus some kraft pulp. The Defense Production Administration has approved the plant, together with several others scattered through the Nation. When built, these plants will add 490,000 tons to the industry's capacity, on top of recent domestic production of about 1,100,000 tons per year.

Coal's opportunity in the paper market can be measured against a survey, by Appalachian Coals, Inc., of fuels used in 37 pulp and paper mills in the Southeast. Completed November, 1951, the study shows that coal accounts for about 56% of total fuels purchased by the paper industry in that area; oil,

How 1952 Shapes Up for Coal

Things look good for 1952, if you add them all together.

Steel and the electric utilities will increase their output well over 10% in 1952. Barring a big war, the level of general industry will stay high and probably move higher, requiring, in either event, some 4,000,000 to 5,000,000 tons more than in 1951, partly because of a changeover from oil to coal and partly because emphasis now is shifting from plant construction, which takes little or no coal directly, to production, which requires a steady stream of power and raw materials.

Railroad tonnage will not decline much more since there's already a shortage of motive power for heavy defense shipments. Exports will be geared to Western Europe's coal crisis, which shows no real let-up.

Thus the figures for 1952 look something like this:

Bituminous	Tons
Retail	83,000,000
Railroads	55,000,000
Electric utilities	110,000,000
Coke ovens, steel and rolling mills	134,000,000
Cement mills	9,000,000
Other industrials	104,000,000
Exports:	
Western Europe	45,000,000
Others	30,000,000
Total bituminous	570,000,000
Anthracite	44,000,000

22%; natural gas, 22%. The trend, ACI points out, is toward bigger coal tonnage in the Southeast—a region within easy reach of rich coal-producing fields.

Portland cement mills in 1951 used about 8,300,000 tons of bituminous against 7,919,000 tons in 1950—an increase of nearly 5%. Between 1944 and 1949, in fact, the cement industry boosted its coal use from 3,738,687 to 7,987,000 tons—up 114%. Now, coal provides upwards of 60% of the fuel needs of the cement makers.

Cement output is closely tied to building activity. And building is holding strong, with defense construction taking up the slack created by limits on housing and non-defense construction.

To meet its growing needs, the cement industry added 10,000,000 tons of capacity in 1950 and another 12,000,000 tons in 1951, pushing total capacity up to over 260,000,000 tons per year. Fully 50% of the new capacity is in the South, not far from abundant supplies of natural gas. But vast coal fields also are close by, with a good chance that wide-awake coal salesmanship can capture much of this growing market.

Coal and Atomic Energy

INSTEAD OF DISPLACING COAL, atomic energy bids fair to become one of coal's best customers.

Here's the way it looks:

1. The squeeze is on Tennessee Valley Authority's power grid. That's because there's renewed activity at Oak Ridge and because a growing complex of industries has moved into Tennessee in search of cheap hydro power. Now, power is critically short of needs and the new atomic plant near Paducah, Ky., close by the Ohio River, is compounding the injury.

2. To meet soaring power needs, TVA has built, is building or expects to build six steam-electric plants as follows:

East Tennessee — Watts Bar, now in operation, and Kingston, under construction.

West Tennessee — Johnsonville, under construction.

Northern Alabama — Widows Creek, under construction, and Colbert, projected.

West Kentucky — Shawnee, under construction.

Total capacity of the six stations will be 6,000,000 kw. Coal, over 8,000,000 tons per year by 1954, will generate well over half of it. In fact, an FPC ruling in November, 1951, forbidding use of natural gas at Johnsonville, may push coal use even higher if the same reasoning is extended to other TVA plants.

3. Across the Ohio River from TVA's Shawnee plant, at Joppa, Ill., Electric Energy, Inc., will build a 652,000-kw steam station to supplement output at Shawnee. Completed, Joppa will burn 2,000,000 tons of coal per year.

It adds up to this: TVA, recently using some 900,000 tons of coal per year, soon will burn 8,000,000 to 10,000,000 tons.

To fill its needs, TVA has contracted for 27,795,750 tons of coal over periods from 10 mo to 10 yr. In nearby coal fields a ferment, noticeable even before contracts were let, picked up speed. Now, with contracts signed, there are gaps between coal producers' commitments and their tonnage in 1950. Those gaps will have to be bridged with new or enlarged mines.

Coal and Home Heat

ON THE HOME - HEATING FRONT, the outside thermometer is the key to coal use.

Except for brief cold snaps, winters in most areas of the Nation were mild in 1949 and 1950. Though it's too early to predict what the 1951-52 winter will be like, it at least got off to a warm start. In addition, the summer fill-up campaigns in anthracite and bituminous ran into price resistance and customer indifference reflecting past warm winters.

The upshot is that retail dealer deliveries of bituminous in the first 9 mo of 1951 were down nearly 20% below 1950 and anthracite output at the end of November lagged 8 to 9% behind 1950.

But all is not lost.

Here are solid facts supporting the view that domestic heating still is a strong coal market and can be made stronger:

1. Population is growing. It's estimated that on Nov. 1, 1951, there were 4,000,000 more people and 1,300,000 more families in the United States than when the 1950 census was taken. Population growth pushes the energy curve up.

2. About 14,557,300 homes—one-third of the Nation's total—were heated with coal in 1950. Since then, about 2,000,000 homes have been built. Figures on heating equipment sales indicate that coal has gone into a substantial number of these new houses. Here are the figures:

	Jan.-Aug. 1950	Jan.-Aug. 1951	Per Cent Change
Residential oil burners	553,457	421,965	—31
Forced-air gas units	257,502	198,150	—30
Coal stokers, Classes I&II	10,894	10,799	— 0.9

3. Talk about the coming oil shortage has been pretty convincing. Besides, many natural-gas companies have fallen short of commitments, especially in cold spells, or have turned away new customers. That's why many homeowners are ripe for a vigorous approach by coal. Coal Heating Service of the National Coal Association, Bituminous Coal Research, Inc., and the Anthracite Institute are moving in to take advantage of this frame of mind.

4. New and better coal-burning equipment for bituminous and anthracite is on the market. More is on the way. The two solid-fuel industries are bringing builders and architects into their orbit, with the result that more homes are being designed to use coal, if not now, then at some future date.

Coal and Uncle Sam

STEADY COAL USER and strong booster—that's government's role.

The war in Korea has changed the government's attitude toward coal. In time, Uncle Sam may boost his use of coal well above the 7,000,000 to 9,000,000 tons now being used, not counting TVA.

Here are the facts:

1. In February, 1951, the Munitions Board sent a memo to all defense agencies urging that coal be made No. 1 choice among fuels. Though it's not clear what fuels have been bought since then, it can be said that there's a sizable market for coal in reactivated and new defense installations. Here's a partial list, mostly within quick reach of coal fields:

Atlantic Seaboard—Seabee Center, Davisville, R.I.; Naval Aeronautical Laboratory, Newark, N.J.; Fort Hancock, N.J.; Army Signal Corps, Tobyhanna, Pa.; Naval Training Center, Bainbridge, Md.; Naval Air Facility, Brunswick, Me.; GSA magnesium plants, Canaan, Conn., and Wingdale, N.Y.

Appalachian area—GSA magnesium plant, Painesville, Ohio; Ravenna Arsenal, Ravenna, Ohio; Ordnance Works, Morgantown, W. Va.

Southeast—Pinecastle Air Force Base, Orlando, Fla.; Morrison Field, West Palm Beach, Fla.; Naval Auxiliary Air Station, Sanford, Fla.; 89th Specialized Depot, Air Force, Gadsden, Ala.; Signal and Chemical Corps, Fort McClellan, Ala.; Moody Air Force Base, Valdosta, Ga.

2. The Office of Price Stabilization raised ceiling prices on fuel oil late last summer. In effect, the agency said: Oil is far from plentiful and a price boost will turn industrial users to coal.

3. The FPC has cracked down on big natural-gas transmission companies and distributors, slowing down their expansion.

4. Interior Secretary Chapman is urging industry to build and operate synthetic liquid fuel plants to provide chemicals, oil and gasoline. The economics of turning coal into oil still is being debated.

Coal's Export Market

THE EXPORT TREND IS UP. Since the outlook in Europe became grim early last year, coal exports from the United States have boomed, the September figure representing an annual rate of over 40,000,000 tons. Some spokesmen suggest the total may reach 50,000,000 tons in 1952.

Here are the bituminous tonnage figures for the first 8 mo of 1950 and 1951:

Destination	Jan.-Aug. 1950	Jan.-Aug. 1951
Western Europe including Great Britain	273,456	15,431,726
North & Central America	14,000,000	15,319,996
South America	774,293	1,862,954
Asia	10	1,048,832
Africa	30,875	682,909

Federal shipping agencies have released a good-sized fleet of bulk cargo vessels from reserve. As of Oct. 19, 1951, 464 vessels were operating under general agency agreements or bare boat charters and 75 additional ships had been authorized and assigned.

Coal's Blue Yonder

IT MAY BE A LONG TIME—but not as long as some think—before we mine coal by remote control from the surface. And it may be a long time before we convert coal automatically to customers' specifications and either pump it as a solid, a liquid or a gas to its destination; or deliver it to users as electric energy by wireless transmission.

When that day comes, coal will be infinitely flexible and trouble-free, with an unlimited market and no serious competitive problems.

But for the time being, it's enough to see the blue sky just ahead. Here's what we can see:

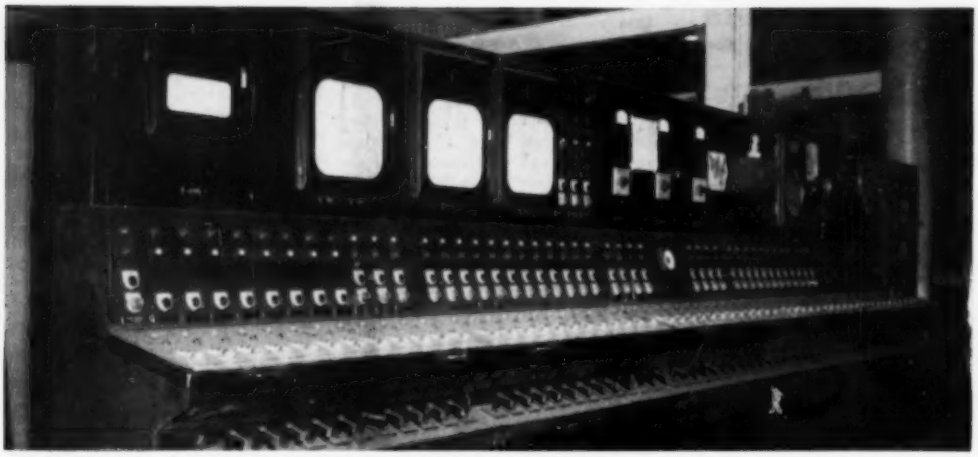
1. The coal-fired gas turbine is well on the way. It will recapture coal's railroad market and open new markets in marine and stationary power.

2. Making gas from coal is growing cheaper as engineers find new ways to cut costs. A little more, and it may be economical to build standby gas producers alongside natural-gas pipelines. When natural gas gives out, 25 yr or more hence, coal would take over the whole load.

3. Coal will take over more of the gross energy market. Already, with a vision of daily demand for 9,100,000 bbl per day 10 yr hence, the oil industry is (1) looking doubtfully at its reserves and (2) installing more catalytic crackers to upgrade residual oil into distillate fuels. Also, there's a growing feeling that natural gas should not be burned under boilers—certainly not on coal's doorstep. The next few years will see the gas-producing states taking a firmer hold on their resources. Wherever gas and oil move out, coal must move in.

4. The key to bigger coal markets is low cost. Outside the industry, every price boost — and more are on the way—makes coal relatively cheaper. Within the industry, there's a never-ending search for ways to cut costs. The many small economies growing out of the collective and individual ingenuity of coal men from the top office to the working face, plus wise investment in new mines and modern equipment, are keeping the industry on top of its cost problems.

5. Besides everyday cost-cutting and everyday ingenuity, coal men are laying plans to take big chunks out of the cost of coal to its customers. Continuous-miner operations are producing more tons with fewer men—an approach to the no-men-underground technique projected for the far future. Moving coal to market by pipeline may knock a big hole in delivered cost. And making gas from coal by underground conversion — skipping the cost of mining altogether —may become the accepted way of producing a cheap boiler fuel, an acceptable domestic gas and a synthesis gas for conversion to liquid fuel in the not-too-distant future.



LUBRICATION'S ROLE in cutting cost and maintaining production at Georgetown No. 12 is evidenced by this control panel in the central plant. The top left half of the board is devoted to lubrication controls, indicators and chart recorders.

Making Lubrication Pay

$75,000 a year in maintenance of stripping equipment, $20,000 a year in maintenance of dry preparation plant, and $25,000 a year in lubricants are only part of the savings being attained by advanced lubrication methods at Georgetown No. 12 mine. Here is the seven-point program providing these results:

1. Addition of a lubrication engineer to the staff.

2. Thorough study of the lubrication problem, including equipment, methods of operation, lubricants, lubricating equipment and lubricating practices.

3. Standardization of lubricants, lubricating equipment and lubricating practices.

4. Establishment of completely enclosed lubricant-handling and dispensing systems.

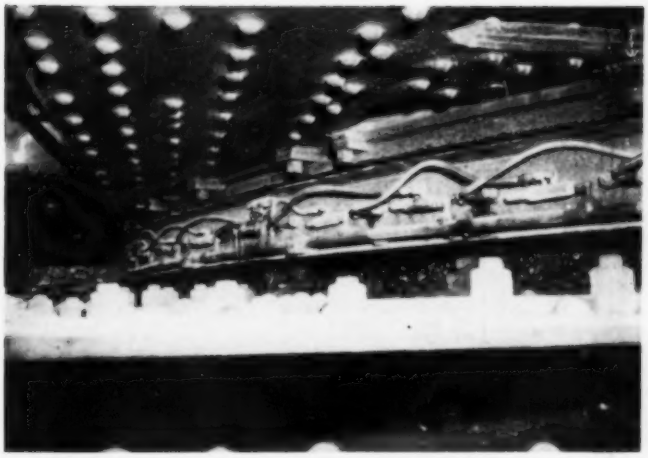
5. Simplification and charting of lubricating methods in combination with education of the men involved in lubrication in the values of good lubrication and its methods.

6. Installation of fully automatic time-controlled centralized systems for mass lubrication wherever possible to conserve manpower, promote safety and, above all, insure positive delivery of the right lubricant in the right quantity and at the right time to all bearings in the systems, regardless of operating conditions.

7. Institution of a simplified control plan to make sure that the job is done—and done according to schedule.

WITHOUT a thin film of oil or grease, industry as it is known today, including coal mining, would be impossible because the machines on which it is based would be impossible. At the Georgetown No. 12 plant of the Hanna Coal Co., a division of the Pittsburgh Consolidation Coal Co., Georgetown, Ohio, that thin film—of the right kind and in the right place at the right time—is provided at a minimum of cost by a lubrication program evolved in a study of the problem going back nearly 10 yr.

The overriding goal in the Georgetown program naturally was maximum production per man—and per machine-hour—attained by reducing to as near zero as pos-



LUBRICATION "FIRST" at Hanna—manifold, takeoffs and injectors for the automatic system serving the circle rollers on a big stripping shovel.

sible downtime for lubrication and for repairs resulting from bearing failures. Collateral but scarcely less vital goals were:

1. Safer equipment and safer lubrication methods.
2. Reduction in equipment maintenance cost.
3. Reduction in the cost of lubricating materials.
4. Reduction in the labor requirements for lubrication.

To attain these safety and efficiency goals, the Georgetown lubrication program, in its present complete and thoroughly integrated form, was evolved from the seven-point basic plan set forth on the opposite page.

GEORGETOWN APPROACH

Georgetown No. 12 was selected for initiation of the Hanna lubrication program because of the nature of the operation, which is stripping and which, in turn, involves concentrating high productive capacity in a relatively small number of large units, with consequent vulnerability to breakdowns and delays.

To initiate and carry on the program, Wayne S. Fuhr was brought in as lubrication engineer. With University of Missouri and ICS training as a mechanical engineer and early experience in maintenance, Mr. Fuhr came to Hanna from the Wheeling Steel Co., where he had progressed from maintenance into lubrication, finding his maintenance experience a valuable tool in his lubrication work.

Study of the Georgetown problem started in 1942 under Mr. Fuhr's direction. This involved, among other things, determination of the life of various equipment units as a means of gaging whether the cost of adding improved lubrication facilities would be justified. The study took in not only stripping, loading, haulage and auxiliary equipment, but also preparation facilities, which now include the new Georgetown central plant (September, 1951, *Coal Age*).

The central plant job involved the installation of power-operated time-clock controlled centralized lubrication systems automatically serving over 1,000 bearings on a wide variety of washing, drying, screening and auxiliary equipment, including bearings under 3 ft of water. Approximately 90% of the lubricating system for the Georgetown central plant was designed by Mr. Fuhr. In addition, Hanna also operates an older plant for dry preparation by picking, screening and crushing, likewise equipped for centralized automatic lubrication.

Production equipment at Georgetown includes the following, all embraced in the lubrication program:

Fourteen stripping and loading shovels ranging up to 50 cu yd in capacity (four 5561 Marion, two Bucyrus-Erie 120-B, and one each of the following: Marion 4160, 372, 361 and 300-E; Bucyrus-Erie 550-B, 54-B, 44-B and 45-B; P&H 1500; Lorain 75).

Nineteen overburden drills (eight Hardsocg horizontal, four Joy Champion and three Bucyrus-Erie 42-T vertical; and four special platform units).

Forty 17-ton Euclid coal-haulage trucks with 150-hp Cummins diesel engines, plus one lowboy transporter and one heavy-duty repair truck converted from the original Euclids.

Twenty-eight tractors (13 Caterpillar D-7, eight D-8, three Allis-Chalmers HD-19 with torque converters, three IHC TD-24, and one rubber-tired Tournadozer).

Four self-powered scraper units (two LeTourneau and two La-Plant-Choate).

Twelve standard scrapers (eight LeTourneau, two Bucyrus-Erie and two LaPlant-Choate).

Six road patrols (four Caterpillar No. 12, one Adams, one Austin-Western).

Five sweepers (two Allis-Chalmers and three IHC).

Eighty-seven service trucks (½-ton to 6x6), one Barber-Greene ditcher, two Haiss loaders, four lowboys, one fork-lift truck, one Sterling earthborer, one 20-ton Link-Belt mobile crane, three rippers, two rooters, 21 Schramm and Gardner-Denver portable compressors, 16 pumps (most 3-in), etc.

STANDARDIZING LUBRICATION

Completion of the preliminary study to define the problem and indicate the procedure was followed by standardization of both lubricating materials and practices. The main objectives were:

1. A reduction in the number and types of lubricants employed to simplify purchasing and application, prevent mistakes, reduce waste and upgrade quality.

2. Reduction in the types of lubricating equipment and maximum interchangeability between types of equipment and applications.

Lubricant standardization, in addition to a major reduction in the number of suppliers, reduced the number of principal types approximately as follows:

	Types Before	After
Motor oil, heavy-duty detergent	2	1
Gear oil, all enclosed gear cases	4	1
Antifriction-bearing grease	5	1
Plain-bearing grease		1
Open gears	3	2
Cable dressing	5	1
Compressor oil	3	1
Hydraulic oil	7	1
	29	9

Standardization also was ac-

Scheduling and education enhance results in lubrication . . .

46A Shovel Marion 5561

Lubricate Today—Help Prevent Costly Delays

Part	Method of Lubricating	Lubricant
Transformer & oil switches	Fill according to manufacturer's recommendations	Cities Service transformer oil #1159
Electric motors & generators		
Plain bearings	Oil lubricated	HDSX oil SAE 20—All Year
Ball or roller bearings	Grease lubricated	BRB#3—All year
Falk couplings	Grease lubricated	BRB#3—All year
Fasts couplings	Oil lubricated	Compound #8—All year
Plain Bearings	Hand grease gun or Lincoln automatic system	Sovarex #LO—Winter Sovarex #L1-L2—Summer
Ball & roller bearings	Hand grease gun	BRB #3 grease—All year
Wire rope	Hand oiler	Viscolite oil cable dressing Heavy—Summer Medium—Winter
Stationary Boom Cables	Hand oiler	Viscolite oil cable dressing Heavy—Summer Medium—Winter
For cleaning of all wire ropes	Brush on	C.S. Penetrating oil #1239
Air compressor	Crankcase Change oil once a month	Hanna oil #3—All
Air lines	Line oilers	Almo #3—Summer Almo #1—Winter
Open or partially enclosed gears, rack & sliding surfaces	Brush on hot	Gear protection composition Intermediate—Winter Summer—for Summer
Enclosed gears Caterpillar cases	Splash	Compound #3—10 deg F to below 0 Compound #5—Winter Compound #8—Summer
Swing gear cases	Circulation	Compound #3—Winter & summer
Worm drive cases	Splash	Compound #3—Winter & summer
Hydraulic systems	Circulation	Hydraulic oil #1
Extension shaft roller bearings	Splash Keep filled to level plug. Check oil level every week. Drain & refill every 2 mo, oftener if oil is dirty.	HDSX 20 oil—All year
Steering motor gear case	Splash	HDSX 20 oil—All year
Gantry idler sheave Padlock sheave Point sheave	Hand grease gun	One 15 oz hand gun full once a month for each sheave bearing—B.R.B. No. 3—All year
Enclosed gear-reduction case for dipper trip cable	Splash	Hydraulic oil #1—All year
Worm drive for power, cable reel and auxiliary hoist	Splash	Compound No. 3—All year
Crowd limit switch gear box	Splash Keep enough oil in case so gears will dip in same. Remove top cover and inspect once each month.	Hydraulic oil #1—All year
All stationary pins, support cable anchor and clevis pins, boom pins, stiff-leg pins, all gantry frame pins	Hand grease gun or oil can. Oil or grease once a month.	Same oil or grease as used on other parts of machine
Emergency light plant	Splash	HDSX SAE 20 oil—All year
RATIO motor worm gear case for point sheaves	Splash	HDSX SAE 20 oil—All year

OIL LEVEL in all enclosed gear cases must be checked once a week, or more often if necessary. This should be done while machine is idle in order to get true oil level.

Report any bad oil leaks or grease fittings that will not take grease to pit foreman as soon as possible.

This machine must be properly lubricated each operating shift.

W. S. Fuhr, Lube Engr.

46A Lubrication

Lubricate Today—Help Prevent Costly Delays

3rd or Afternoon-Shift Oiler

Normal Operating Conditions

1. Check automatic lubricating system and recording chart.
2. General greasing in house and gantry with hand gun.
3. Check all swing cases, oil pressure, oil filter screens and oil level. Clean screens if necessary.
4. Check all open gears and sliding surfaces and apply gear dope, where needed.
5. Grease circle rollers during lunch period—4 shots of grease from automatic system.
6. Bucket to be greased by shovel dozer operator during lunch period.
7. Grease all fittings on #3 and #4 cats.
8. Grease all bearings on the two long propel shafts under deck as near as possible to the middle of operating shift. When deadheading, these bearings should be checked for overheating and greased as often as operating conditions demand; same from overheating.
9. Drain water from air compressor tank and filter once a shift.
10. Check all bearings each shift to be sure they are well lubricated and are not running too hot.

If oiler on any shift does not get his regular greasing done, due to repair delays, he should pass on to the oncoming oiler the proper information so that he can finish greasing where the preceding oiler stopped. Report any bad oil leaks or grease fittings that will not take grease to pit foreman as soon as possible.

W. S. Fuhr, Lube. Engr.

46A Lubrication

Lubricate Today—Help Prevent Costly Delays

2nd Shift Ground Oiler

Normal Operating Conditions

1. If possible, start greasing #3 cat assembly, then #4, #1 and #2.
2. Grease all other fittings under-deck.
3. Check oil level in all cat gear cases.
4. Apply gear dope on all propel gears where needed.
5. Change oil and filter once a month on air compressor.
6. Drain water from air compressor tank and filter once a shift.
7. Drain hydraulic oil filters once a month.
8. Drain sludge and water from hydraulic oil tanks once a month.
9. Remove and wash hydraulic oil filter elements every 3 mo.
10. Grease bucket during lunch period.
11. Check all bearings each shift to be sure they are well lubricated and are not running too hot.

If oiler on any shift does not get his regular greasing done, due to repair delays, he should pass on to the oncoming oiler the proper information so that he can finish greasing where the preceding oiler stopped. Report any bad oil leaks or grease fittings that will not take grease to pit foreman as soon as possible.

Good Lubrication Means

Safety . . . Low operating costs . . .

Fewer shutdowns . . . More production . . .

Job security . . .

W. S. Fuhr, Lube. Engr.

5561 Marion Shovel 46A Marion Lubrication

2nd Shift Inside Oiler

Normal Operating Conditions

1. Check Lincoln lubrication system. Be sure plenty of grease is in drum.
2. Check all swing cases, oil pressure and oil level.
3. Check all swing case oil filter screens. Clean if necessary.
4. General hand-gun greasing of fittings in house and gantry.
5. Check all open gears and sliding surfaces and apply gear dope where needed. Use brush where possible.
6. Check cables. Apply lubricant when needed.
7. Grease point and dipper sheaves once a month, also gantry idler sheave.
8. Check hoist extension-shaft bearing-oil level each shift, while bearings are idle. Don't fill above level plug. When oil begins to get dirty or show signs of any cuttings, drain and refill until oil stays clear. After refilling, oil level should be rechecked after running about 5 min.
9. Check oil level in both hydraulic oil supply tanks for jacks. In cold weather, check heating elements for tanks to see that oil is warm. Approximately 65 deg F.
10. Grease circle rollers during lunch period—4 shots of grease from automatic system.
11. Check knuckle and point sheave lubrication during shutdown for lunch.
12. Do not apply cable dressing on last three wraps on hoist drum.
13. If any bearing should run hot on deadheading, pump extra grease in through injector fitting with hand grease gun.
14. Motors and generators using oil, drain and refill every 6 mo.
15. Check all bearings each shift to be sure they are well lubricated and are not running too hot.

Fasts flexible couplings—check and lubricate every 3 mo.

Falk flexible couplings—check and lubricate every 3 mo.

Lubricate all electric motors and generators every 6 wk.

If oiler on any shift does not get his regular greasing done, due to repair delays, he should pass on to the oncoming oiler the proper information so that he can finish greasing where the preceding oiler stopped.

Keep record in lubrication book up to date.

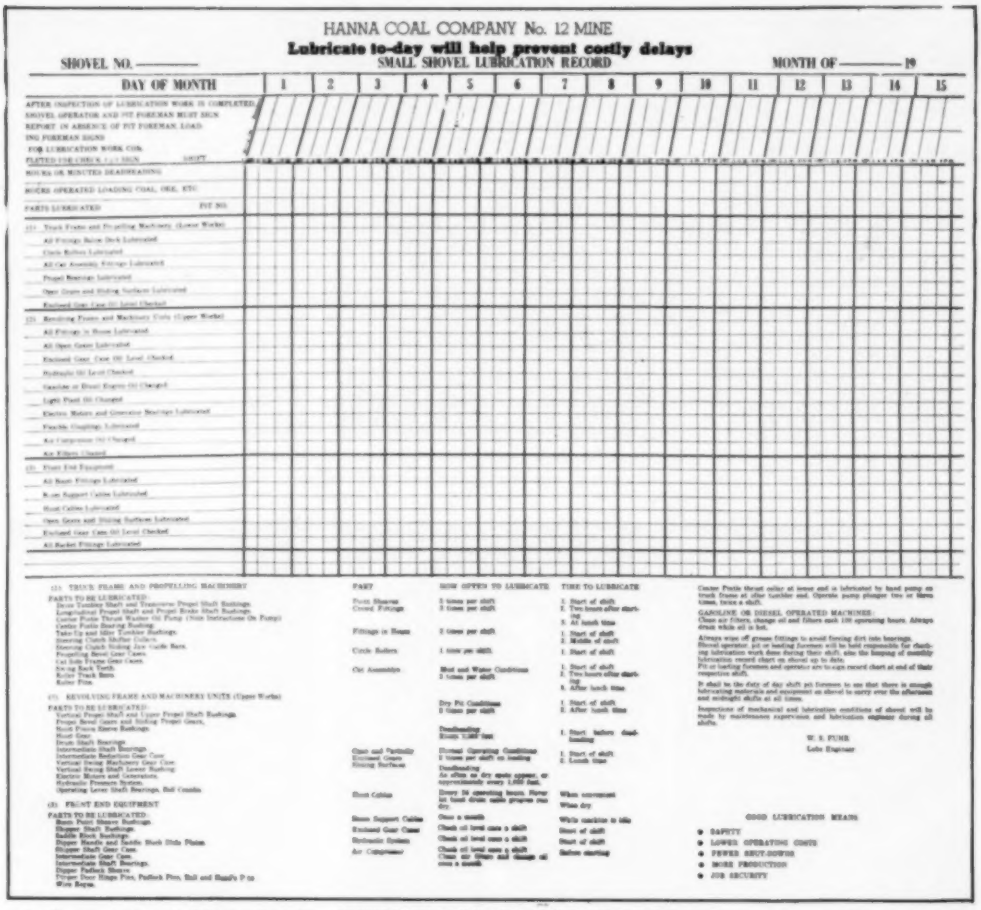
W. S. Fuhr, Lube. Engr.

46A Lubrication

Lubricate Today—Help Prevent Costly Delays

1st Shift Oiler 12:01 Midnight

1. Check automatic lubricating system and recording chart. Change chart.
2. Oiler should check all swing cases to see if circulating oil pump has pressure enough to circulate oil to bearings and gears. This can be done by opening the petcock in oil line on top of swing gear case. Oil filter screen for each swing case should be checked and cleaned, if necessary, each shift.
3. General greasing with hand gun to be done in house and gantry.



HANNA COAL COMPANY No. 12 MINE

Lubricate to-day will help prevent costly delays

SHOVEL NO. ———— SMALL SHOVEL LUBRICATION RECORD MONTH OF ———— 19

DAY OF MONTH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
AFTER INSPECTION OF LUBRICATION WORK IS COMPLETED, SHOVEL OPERATOR AND PIT FOREMAN MUST SIGN REPORT IN ABSENCE OF PIT FOREMAN, LOADING FOREMAN SIGNS FOR LUBRICATION WORK COMPLETED (OR CHECK (√) SIGN OPPOSITE)	1 2 3														
HOURS OR MINUTES DEADHEADING															
HOURS OPERATED LOADING COAL, ORE, ETC.															
PARTS LUBRICATED — PIT NO.															
(1) Truck Frame and Propelling Machinery (Lower Works)															
All Fittings Below Deck Lubricated															
Circle Rollers Lubricated															
All Cat Assembly Fittings Lubricated															
Propel Bearings Lubricated															
Open Gears and Sliding Surfaces Lubricated															
Enclosed Gear Case Oil Level Checked															
(2) Revolving Frame and Machinery Units (Upper Works)															
All Fittings in House Lubricated															
All Open Gears Lubricated															
Enclosed Gear Case Oil Level Checked															
Hydraulic Oil Level Checked															
Gasoline or Diesel Engine Oil Changed															
Light Plant Oil Changed															
Electric Motors and Generator Bearings Lubricated															
Flexible Couplings Lubricated															
Air Compressor Oil Changed															
Air Filters Cleaned															
(3) Front End Equipment															
All Boom Fittings Lubricated															
Boom Support Cables Lubricated															
Hoist Cables Lubricated															
Open Gears and Sliding Surfaces Lubricated															
Enclosed Gear Case Oil Level Checked															
All Bucket Fittings Lubricated															

(1) TRUCK FRAME AND PROPELLING MACHINERY

PARTS TO BE LUBRICATED:
Drive Tumbler Shaft and Transverse Propel Shaft Bushings.
Longitudinal Propel Shaft and Propel Brake Shaft Bushings.
Center Pintle Thrust Washer Oil Pump (Note Instructions On Pump)
Center Pintle Bearing Bushing.
Take-Up and Idler Tumbler Bushings.
Steering Clutch Shifter Collars.
Steering Clutch Sliding Jaw Guide Bars.
Propelling Bevel Gear Cases.
Cat Side Frame Gear Cases.
Set-up Rack Teeth.
Relief Track Bars.
Roller Pins.

PART	HOW OFTEN TO LUBRICATE	TIME TO LUBRICATE
Pintle Bearing	2 times per shift	1. Start of shift.
Control Fittings	2 times per shift.	2. Two hours after start-ing
		3. At lunch time
Fittings in Boom	2 times per shift.	1. Start of shift
		2. Middle of shift
Circle Rollers	1 time per shift.	1. Start of shift
Cat Assemblies	Mist and Water Conditions 2 times per shift.	1. Start of shift. 2. Two hours after start-ing 3. After lunch time
	Dry Pit Conditions 2 times per shift	1. Start of shift. 2. After lunch time
	Deadheading Every 1,000 feet	1. Start before dead-heading
Gear and Partially Enclosed Gears Rotating Surfaces	Normal Operating Conditions 1 times per shift on loading	1. Start of shift 2. Lunch time
	Deadheading As often as dry spots appear, or approximately every 1,000 feet.	
Hoist Cables	Every 10 operating hours. Flush at least three times during the day.	When convenient When dry
Boom Support Cables	Once a month	With cables in idle
Enclosed Gear Cases	Check oil level once a shift	Start of shift
Hydraulic System	Check oil level once a shift	Start of shift
Air Compressor	Check oil level once a shift. Clean air filters and change oil once a month	Before starting

Center Pintle thrust collar at lower end is lubricated by hand pump on truck frame at idler tumbler end. Operate pump plunger two or three times, twice a shift.

GASOLINE OR DIESEL OPERATED MACHINES:
Clean air filters, change oil and filters each 100 operating hours. Always drain while oil is hot.

Always wipe off grease fittings to avoid forcing dirt into bearings.
Shovel operator, pit or loading foreman will be held responsible for checking lubrication work done during their shift, also the keeping of monthly lubrication record chart on shovel up to date.
Pit or loading foreman and operator are to sign record chart at end of their respective shift.

It shall be the duty of day shift pit foreman to see that there is enough lubricating materials and equipment on shovel to carry over the afternoon and midnight shifts at all times.

Inspection of mechanical and lubrication conditions of shovel will be made by maintenance supervision and lubrication engineer during all shifts.

W. S. FUHR
Lube Engineer

GOOD LUBRICATION MEANS

- SAFETY
- LOWER OPERATING COSTS
- FEWER SHUT-DOWNS
- MORE PRODUCTION
- JOB SECURITY

(2) REVOLVING FRAME AND MACHINERY UNITS (Upper Works)

PARTS TO BE LUBRICATED:
Vertical Propel Shaft and Upper Propel Shaft Bushings.
Propel Bevel Gears and Sliding Propel Gears.
Hoist Pinion Sleeve Bushings.
Hoist Gear.
Drum Shaft Bearings.
Intermediate Shaft Bearings.
Intermediate Reduction Gear Case.
Vertical Swing Machinery Gear Case.
Vertical Swing Shaft Lower Bushing.
Electric Motors and Generators.
Hydraulic Pressure System.
Operating Lever Shaft Bearings, Ball Cranks.

(3) FRONT END EQUIPMENT

PARTS TO BE LUBRICATED:
Boom Point Sleeve Bushings.
Dipper Shaft Bushings.
Saddle Block Bushings.
Dipper Handle and Saddle Block Ditch Planes.
Dipper Shaft Gear Case.
Intermediate Gear Case.
Intermediate Shaft Bearings.
Dipper Pullback Sheave.
Dipper Door Hinge Pins, Pullback Pins, Bail and Handle Pins and Wire Ropes.

4. All open gears and sliding surfaces in house and gantry needing lubrication should have gear dope applied once a shift, provided operating conditions are normal; otherwise apply as needed.

5. Under-deck greasing to be done (normal operating conditions): Grease all bearings on the two long propel shafts under deck, as near as possible to the middle of operating shift. When deadheading, these bearings should be checked for overheating and greased as often as operating conditions demand; same from overheating.

6. Crawler or cat assemblies: Grease all fittings on #1 and #2 cats during the 8-hr shift. Check all propel gears for bare metal spots or cutting of teeth. If necessary, apply gear dope.

7. Check cables. Apply lubricant if needed.

8. Bucket to be greased by shovel dozer operator during the shutdown period for lunch.

9. Oiler to grease circle rollers during the shutdown period for lunch—4 shots of grease from automatic system.

10. Drain water from air compressor tank and filter once a shift.

11. Check all bearings eacn shift to be sure they are well lubricated and are not running too hot.

If oiler on any shift does not get his regular greasing done, due to repair delays, he should pass on to the oncoming oiler the proper information so that he can finish greasing where the preceding oiler stopped. Report any bad oil leaks or grease fittings that will not take grease to pit foreman as soon as possible.

W. S. Fuhr, Lube. Engr.

COMBINED LUBRICATION SCHEDULES and report forms posted in smaller shovels have the two halves of a particular month on the two sides.



SCHEDULING promotes efficiency in lubrication. Charts for a big strip shovel (opposite page) are posted on wall.

companied by certain changes in the types of lubricants in the interest of better performance. Straight mineral oil, for example, was used in crankcases before standardization, whereas the present type is distinguished by a higher percentage of additives for better performance and better cleaning. Now, also, gear oils are the extreme-pressure type, regardless of duty. This, among other things, prevents misapplication. For winter against summer operation, no change is made in type. Instead, where required, a lighter material of the same type is employed.

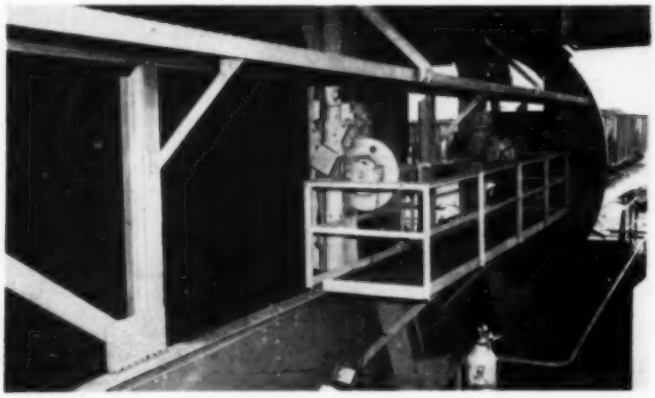
Standardization and reduction in the number of lubricant types was not always a simple matter of choosing one or more out of a list. Actually, since each type under the

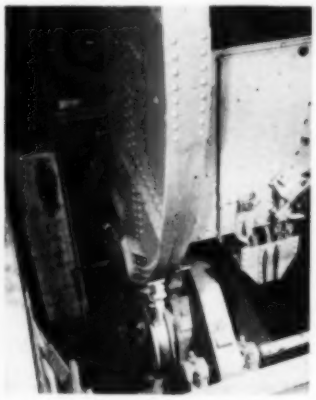
Better lubrication promotes efficiency in stripping . . .





CENTRAL STATION for automatic shovel lubrication (left) shows dual pumps, timing equipment and 24-hr recorder. Short downhanging hose (right) fills hand guns as step in eliminating contamination by pumping from original container.





THE BIG in preparation plant equipment served by the automatic systems is this rotary railroad-car dumper. A flexible hose at one end (right photo) brings lubricant from the main pipeline to lines serving the various bearings.

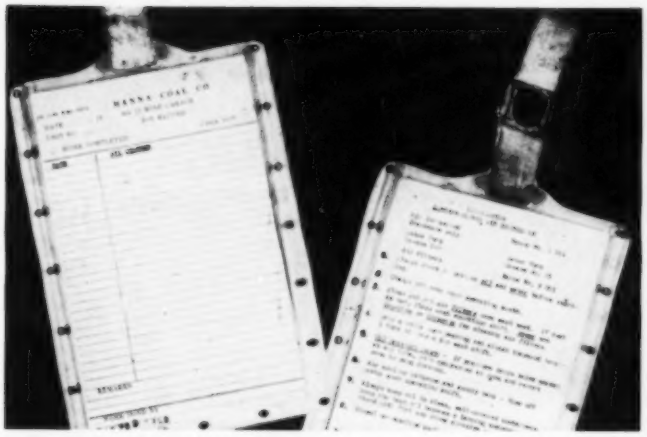
new schedule had to cover a wider range of operating conditions, very careful study was necessary to make sure that each type had the necessary spread for a variety of applications and services. The assumption that this would be possible has worked out well in practice.

Standardization also, of necessity, required buying to specifications as related to the various applications, rather than on general representations as to the suitability of a particular lubricant to a particular application. Thus, application is based primarily on physical and chemical characteristics susceptible to laboratory determination at any time. This is considered a keynote in the Georgetown program.

Standardization of lubricating equipment has been directed at complete interchangeability, regardless of the type of machine, whether portable or stationary, as well as at suitability for the job to be done. For hand-gun applications, for example, one type of grease fitting—the Lincoln 5000 Bullneck—is used on all types of equipment. It was selected because location of the ball check in the top of the fitting, rather than in the throat, facilitates sealing dirt out and grease in. Standardization also has been extended to the guns themselves, with the Lincoln 1035 heavy-duty lever-type for high pressure and 1037 for low pressure. Hoses and connectors also have been standardized, both as to type, size and length.

In the automatic centralized systems, the Lincoln SL-1 injector, with output adjustable up to 0.04 oz of lubricant per cycle, is used both on strip shovels and in the preparation plants. Lubricant pumps (all Lincoln for use with original 400-lb drums) are likewise interchangeable. The types are 4-in-series 75:1-ratio heavy-duty air-motor-operated units for high-pressure lubrication (shovels, trucks, dozers, etc.) and 6:1-ratio units for gear oils, hydraulic oils and water, as well as for all lubricant-transfer jobs.

As with lubricants, standardization, with consequent reduction in types of equipment, fittings and auxiliaries, prevents mistakes and delays, reduces the parts inventory and makes it easier for the



SCHEDULE AND RECORD FORMS for such portable equipment as air compressors are hung on the equipment and stay with it.

men to lubricate properly. In fact, making it easier for the men, as well as safer, and thereby gaining their cooperation in achieving the benefits of better lubrication, was a major objective in all the steps taken at Georgetown.

Simplification was carried to the point of giving special names to lubricants, such as "Hanna No. 3," to make it easier for the men to remember the types to be employed and also guard against prejudices against the regular brand names as a result of experience both on and off the job.

HOLDING LUBRICANT QUALITY

With standardization set up, the next step in the Georgetown program was preserving the original qualities of the lubricants—in other words, assuring application of refinery-pure materials and preventing contamination, which experience has shown is perhaps the one big fault in ordinary lubrication practice.

The rule at Georgetown No. 12 is **pumping directly from the original container to the point of use** wherever possible. Even with hand application, the guns are filled by pumping from the original refinery container. And, where transferring is necessary, it is handled by transfer pumps. In other words, open containers and manual handling or pouring are eliminated all along the line, reducing the chances of contamination to as near zero as possible and, in addition, preventing waste as a result of careless handling or dumping of lubricants that have become contaminated.

At garages, as an example of the steps taken to prevent contamination, lubricants are pumped underground—sometimes 200 ft or more—from the oil houses to storage tanks at the lubricating stations for trucks and other equipment serviced in the garage. At the stations, the lubricants are discharged into heated dispensing tanks. As a final safeguard against contamination that might be present in the original containers, filters are installed in the dispensing system. One result of eliminating contamination has been a major increase in engine hours registered between major overhauls.

EDUCATION AND CHARTING

Recognizing that the success of the program rested with the man on the job, an early step at Georgetown was education of personnel charged with lubrication. This has been mainly a personal-contact job, with the major responsibility falling on the lubrication engineer, with yeoman help from maintenance heads. With personal contact as the foundation of the educational program, the approach has been tailored to fit the various jobs and, to some extent, each individual charged with lubrication. It includes material on the fundamentals of lubrication and specific instruction in the types of lubricants prescribed, the equipment and methods used in lubrication, methods of determining the quality of the job, and the benefits to be attained.

In the educational program, as noted previously, the benefits to the men themselves have been stressed as a means of enlisting their cooperation and interest. No. 1 in these benefits is safety, which is particularly apparent where centralized automatic systems make it unnecessary, among other things, for men to go into hazardous places. No. 2 is the fact that by following the prescribed plan the work is materially eased. No. 3 is the fact that if the plan is followed the man is less likely to get into trouble for making mistakes or failing to do a good job.

Education is not limited to lubrication personnel nor to personal contact. All others concerned with machine operation and maintenance—particularly the latter—are included in the program, and the media, other than personal contact, include such things as posters and stickers for windshields, walls and so on. For example, the slogan frequently used on lubrication-schedule sheets is:

LUBRICATE TODAY
HELP PREVENT COSTLY DELAYS
Keep Dirt Out of all Lubricants

One large poster reads:

GOOD LUBRICATION MEANS
Safety • Lower Operating Costs
Fewer Shutdowns • More Production
Job Security

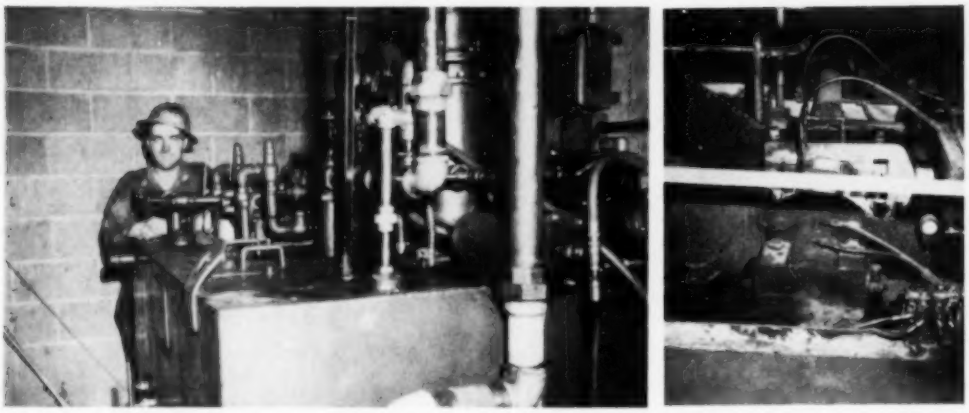
Charting of the specific lubrication jobs was a natural accompaniment of education of lubrication personnel and others. In some instances, the charts are fairly simple and are accompanied by space for keeping a record of what is done. An example (see accompanying illustration) is a small card in a heavy cellophane envelope which is tied to compressors and other highly portable equipment.

A second example of combining in one form the lubrication and record charts is the small-shovel record, also shown in an accompanying illustration. A major reason for this type of chart is the fact that crews for such shovels are subject to considerable shifting, and thus a special form is necessary to make sure new men can take up where others stop.

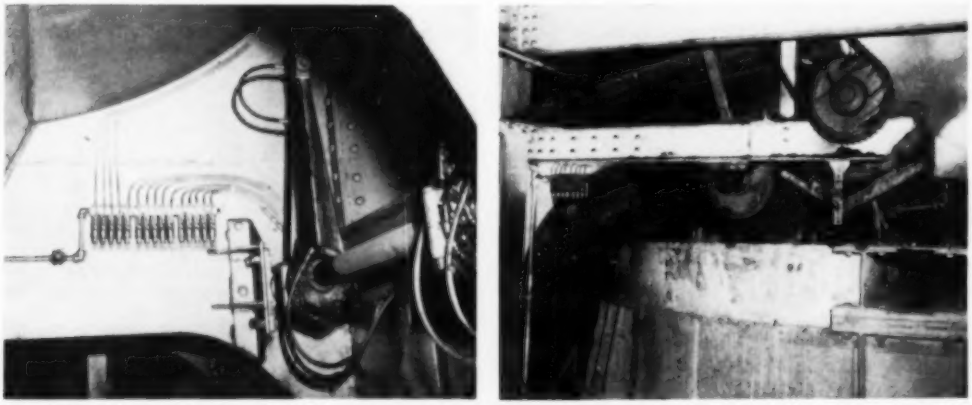
As might be expected, a group of six charts is required for the large stripping shovels. These are posted on the shovel and are supplemented by a separate log book which shows what has been done and enables any new men, in addition, to pick up where the others left off. With these shovels, the latter is less often necessary, but nevertheless the record is there for use at any time and as a check.

As indicated in the accompanying reproductions, the charts for

Preventing contamination a key factor in results . . .



CENTRAL STATION with dual pumps supplies oil to shaker eccentrics. Controls are interlocked so shakers cannot operate unless pressure is right. Safeguards include dual feeds to each bearing (right).



CLEANING EQUIPMENT INCLUDED in the automatic system includes Baum-type wash boxes (left) and sand-flotation cone and feed conveyor (right). Flexible hoses carry grease to bearings in motion, as on the washbox air valves (left).

the big shovels provide for doing the major part of the work on the second shift, which precedes the maintenance and inspection shift and provides daylight for the job.

LUBRICATING STRIPPING UNITS

Both hand and automatic systems are employed in lubricating stripping and auxiliary equipment at Georgetown. The division reflects primarily (a) the cost of special lubricating equipment v. the type of machine and its expected life and (b) the fact that in many instances the man still would be necessary. Consequently, hand lubrication—with, however, the same care in scheduling, reporting, prevention of contamination, etc.—is the usual method.

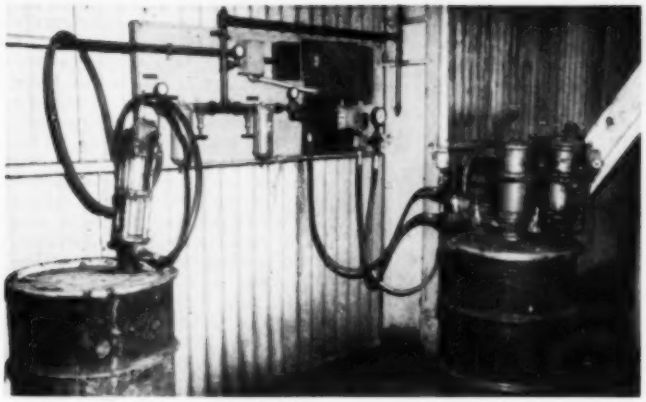
Hand lubrication, however, does not mean pouring and the like, which is outlawed throughout the Georgetown domain, nor does it mean the use of portable guns in all instances. The major part of the "hand" lubrication, in fact, is handled by two lubrication trucks.

The latest trucks, which replaced two earlier units, are designed to go anywhere on the property in any weather and lubricate practically all stripping equipment where it is working. The lubricants are carried in the original refinery containers and are dispensed through hoses on reels. The hoses, and in fact all other equipment on the new trucks, are completely enclosed for additional protection against weather, dust and dirt, with access through doors.

The four big Marion shovels, however, presented a good opportunity for centralized automatic lubrication of certain operations and, consequently, they were fitted with automatic equipment in 1944. The Lincoln CentrOmatic system employed involves an electric-time-clock-controlled air-motor-operated pump with 24-hr recorder dispensing lubricant from an original refinery drum through a single supply line to injectors—one for each bearing and connected by rigid or flexible tubing. Each shovel system serves over 200 bearings while the machine is operating. The one exception is lubrication of the circle-roller bearings, which is done by four-shot applications three times a day during the intermission between shifts.

Functions covered in the automatic system include:

1. Lubrication of all bearings on



NO. 2 OF THREE CENTRAL STATIONS for automatic lubrication of preparation plant. Equipped with dual pumps, it moves grease up to 500 ft.





SPECIAL FACILITIES include air manifolds with quickcoupling outlets (left) for feeding 50-ft hoses for such jobs as spraying open gears.

the dipper-stick swivel and knuckle assembly through 31 injectors. This formerly required stopping the machine 15 min each shift while the oiler climbed the boom in all kinds of weather to grease with a hand gun. This hazard has been eliminated, along with the 45 min previously lost each day.

2. Lubrication of left side of the gantry machinery with 21 grease injectors, with a similar installation for the right side.

3. Lubrication of 98 circle-roller bearings in 4 to 5 min each 8-hr shift. This was the first successful application of an automatic system to circle rollers. Previously the work was done by an oiler with a small hand grease gun while the machine was rotating, normally requiring 2 hr per shift and involving a substantial hazard.

Except for the circle rollers, a lubrication cycle requires 30 to 45 sec, depending upon the outside temperature. Naturally, the supply of lubricant is tailored to the requirements of each bearing by adjusting the injectors to deliver a predetermined quantity. With the old system of hand lubrication considerable damage was done to bearings through overlubricating them at the beginning of the shift and then starving them until the shovel was finally stopped for a new round. In addition, aside from the hazards involved, a large quantity of lubricant was wasted.

As insurance against pressure failure, duplicate pumps are provided for the automatic systems, as shown in an accompanying illustration. In addition to acting as a standby, one also is used to fill hand guns in accordance with the fundamental principle of pumping everything from the original refinery container to the point of use, or, as near as possible.

AUTOMATIC SYSTEMS SERVE PREPARATION PLANTS

The use of centralized automatic lubricating systems at Georgetown reaches full flower in the two preparation plants serving the property. One is a dry plant for preparation by hand-picking, screening and crushing with a capacity of 600 tph, although the operating rate has been as high as 1,000 tph or more. The second, as previously noted, is a new central plant embodying washing, screening, and centrifugal and heat drying, in addition to crushing, hand-picking, boom loading and so on. Capacity is 1,500 tph, and facilities include a rotary railroad-car dump and the necessary car-handling facilities.

Lincoln CentrOmatic systems are used in both plants, with the original going into the dry plant Jan. 1, 1948. Bearing failures in the dry plant have been almost completely eliminated and the saving in maintenance, on the basis of costs previously incurred, is estimated at $20,000 a year.

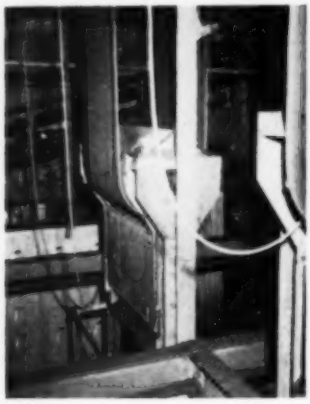
The CentrOmatic system installed in the new plant serves over 1,000 bearings. These are predominantly of the plain sleeve type. This type was selected because of first cost and ease of replacement if and when necessary.

Motor bearings, primarily antifriction, are not included in the centralized systems. Other exceptions are open gears and belt-conveyor idlers. Even with these, however, special provisions for lubrication are installed. These include air and grease lines with quick-coupling outlets wherever a group of bearings can be served by a 50-ft hose.

On the main raw-coal belt, for example, where greasing of the idlers is done every 3 to 6 mo, a manifold with outlets at 100-ft intervals is installed along the wall of the conveyor gallery. With a 50-ft hose this permits greasing 100 ft of conveyor from the one outlet. The manifold is connected to a special high-pressure 75:1-ratio Lincoln lubricant pump.

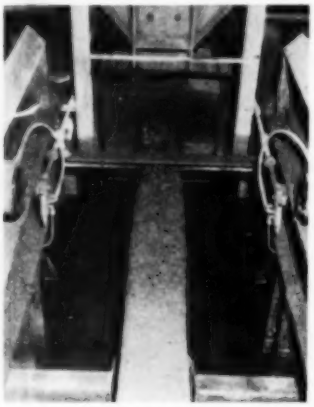
For serving open gears, such as those on the sludge conveyors, air lines are installed with outlets at 100-ft intervals for connecting 50-ft hoses. The lubricant is placed



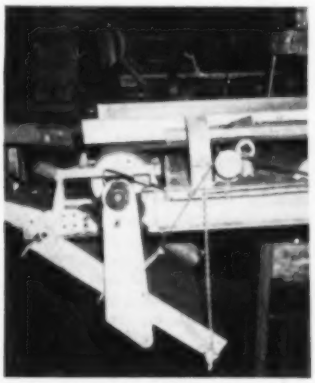


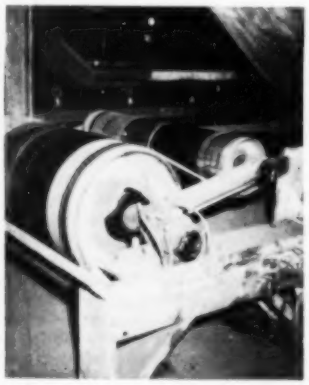
BELT-CONVEYOR TAKEUPS are lubricated automatically by injectors (left), part of which feed counterweight idler through flexible hoses. Belt idlers are lubricated every 3 to 6 mo through a 50-ft hose and gun.





AUTOMATIC-LUBRICATION JOBS at Georgetown No. 12 plant include bearings on tail and head ends of the refuse belts, as well as bearings 3 ft under water (right) on the tail sprockets of settling-tank conveyors.





BOOM LUBRICATION includes dual lines to bearings at discharge end (left) and flexible connections to tensioning idlers on top of belts at the rear (right).

in a spray gun hooked up to the hose, with which the oiler sprays each gear in turn.

Automatic lubrication in the central plant is handled by three pumping stations dispensing grease and one station dispensing oil, the latter for shaker eccentrics, of which there are seven sets on the plant. Approximately 90% of the system was designed by Mr. Fuhr, and designing was done in advance of construction. This involved working from drawings and required extra care to make sure that the service lines would be in the right places and that there would be no interference with the installation and operation of other equipment. The system was installed with no interruption of the construction program.

In the final installation, all the service lines, ranging in size from 2 in I.D. down to ¼ in, were concealed under the floors or otherwise put in inconspicuous, though accessible, places. Extra care also was devoted to placing the lubricant injectors in accessible places to facilitate checking and any necessary maintenance. As a result, all injectors are in the open and can be easily reached without the men being exposed to any hazards.

Three central pumping and control stations including 400-lb-drum-size time-clock-controlled pumps were installed for greasing at the Georgetown central plant. Locations and sections served are as follows:

No. 1, at the rotary dump, serves the dump and car haul. The service line to the car haul and the sheaves outside the car-haul building is more than 400 ft long and is buried underground. To prevent rusting, galvanized pipe was employed and was further protected by a special synthetic coating.

No. 2, in an upper floor of the plant near the head of the main raw-coal conveyor, serves injector circuits in the raw-coal and refuse-handling sections. Maximum distance pumped by this station, to the refuse bins, is approximately 500 ft. Aside from the refuse facilities, equipment served includes the McNally Mogul washers, the Chance cone, the picking tables and all subsidiary conveyors, including conveyors feeding to the Reineveld centrifugal driers, and two coal and stone crushers.

No. 3, on the ground floor of the plant, serves all drying and loading equipment (Raymond flash and Hanna traveling-conveyor types), as well as the equipment in the

NO. 12 MINE HANNA COAL CO.

DIVISION OF PITTSBURGH CONSOLIDATION COAL CO.

SHOVEL LUBRICATION REPORT

Lubricate today—will help prevent costly delays

SHOVEL NO. ..... SHIFT: 1st ☐ 2nd ☐ 3rd ☐ DATE ..... 19.....

All Propel Shaft Bearings Under Deck ..... LUBRICATED ..... YES ☐ NO ☐

All Grease Fittings Under Deck ..... " " ..... YES ☐ NO ☐

No. 1. Cat Assembly ..... " " ..... YES ☐ NO ☐

No. 2. Cat Assembly ..... " " ..... YES ☐ NO ☐

No. 3. Cat Assembly ..... " " ..... YES ☐ NO ☐

No. 4. Cat Assembly ..... " " ..... YES ☐ NO ☐

Gear Dope Applied Where Needed ..... " " ..... YES ☐ NO ☐

DELAYS: From ..... To ..... Caused by .....

Hot Bearings YES ☐ Write below what bearing is running hot.

Hot Bearings NO ☐

Hi Pressure Lubrication System, O. K. ..... YES ☐ NO ☐

All Boom Fittings Lubricated ..... YES ☐ NO ☐

All Bucket Fittings Lubricated ..... YES ☐ NO ☐

All Fittings in House Lubricated ..... YES ☐ NO ☐

All Gantry Fittings Lubricated ..... YES ☐ NO ☐

Cable Dressing Applied ..... YES ☐ NO ☐

Air Compressor Oil and Filter Changed ..... YES ☐ NO ☐

Hydraulic Oil Filters Drained or Cleaned ..... YES ☐ NO ☐

Light Plant Oil Changed ..... YES ☐ NO ☐

Oil and Filter Element Changed on Diesel or Gasoline Shovels ..... YES ☐ NO ☐

OIL LEVEL in all enclosed gear cases must be checked once a week, or more often if necessary. This should be done while machine is idle in order to get true oil level. Report any bad oil leaks or grease fittings that will not take grease to pit foreman as soon as possible. This machine must be properly lubricated each operating shift, also on dead heading.

Grease Fittings that will not take grease ..... NO ☐ YES ☐

Write below the location of grease fittings that will not take grease and explain why if possible. To be made out each shift and sent to Office with other Reports.

All Stripping Shovel Operators and Oilers sign this report.

Other Shovels, Operator sign report for lubrication work done.

REMARKS:

GROUND OILER

INSIDE OILER

SHOVEL OPERATOR

IM 6-48 WBC 10167

BULLDOZER LUBRICATION REPORT

Pit Location ..... Date ..... 195.....

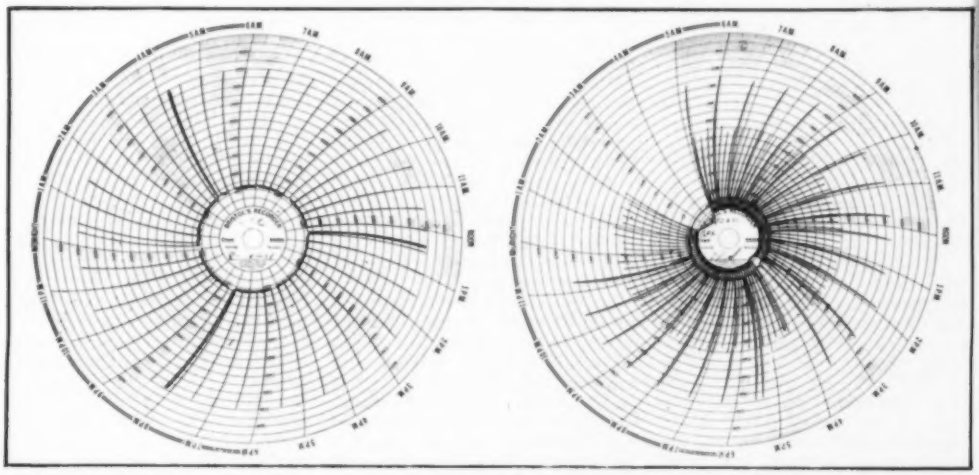
Bulldozer No. ..... Engine Hours .....

	Ck	COST		Ck	Drain	Gal	COST
Chasis			Cost Brought Forward				
Clutch Drive Plate			Diesel Engine				
Clutch Shift Collar			Starting Engine				
Fan Bearings			Injection Pump				
Oil, Filters			Hydraulic Steer, Clutch				
Oil Filter (Removed)			Final Drive (Right)				
Diesel Air Cleaner (Cleaned)			Final Drive (Left)				
Gasoline Air Cleaner (Cleaned)			Transmission				
Radiator			Starting Pinion Shaft Case				
Quarts Alcohol Added			Hydraulic Lift				
			TOTAL COST				
Cost Carried Forward							

Remarks :-

Service Truck Driver

LUBRICATION CONTROL includes reports such as these, one for the big shovels and the other for bulldozers.



GRAPHIC REPORTS on centralized systems are provided by 24-hr recorders. Chart at left shows shovel cycles, including four shots to circle rollers every 8 hr. Chart at right shows pressures and cycles for one central-plant system.

table section (SuperDuty Diagonal-Deck).

For safety and continuity of service, each station is equipped with dual pumps so that if one fails the system can be switched immediately to the other. Also, with the No. 2 and No. 3 stations, complete failure of one pump does not interrupt the lubrication rhythm, as each station has sufficient capacity to take over the load of both.

As further insurance that each bearing gets lubricated according to the regular schedule, each is fitted with two injectors so that if one fails the other still can provide service. Also, since all injectors have been placed where they are in full view, a glance at any time reveals if a failure has occurred and where. Finally, although it is considered extremely doubtful that this will ever occur, bearings can be lubricated in an emergency with hand guns through

How good lubrication cuts maintenance and other costs . . .



LUBRICATION LABORATORY provides facts on new and used lubricants as an aid to better control of lubrication practices and results.



LUBRICATION CHIEF—W. S. Fuhr, guiding spirit in Georgetown program.

the injectors, which incorporate filler fittings.

The lubricating cycle in the preparation plant is every 15 min. except for certain large slow-moving bearings, where a 1-hr interval has been found satisfactory. The times were determined by studying each machine and type of service and fixing the time, as well as the quantity of lubricant injected per cycle, to fit the application. The No. 1 consideration was keeping lubricant in each and every bearing at all times. In practice, as a result of careful study of requirements, the actual quantities of lubricants consumed are reduced in spite of the increased frequency of application, largely as a result of prevention of overlubrication and general waste in handling.

To extend the principle of automatic centralized lubrication to all bearings in the plant, flexible feedline connections were necessary for certain moving pieces of equipment. A 30-ft hose was employed to take lubricant from the main line to the system serving the bearings on the rotary pump. Hoses also were employed in serving the bearings on belt-conveyor take-ups, while tensioning idlers on the ends of loading booms were fitted with copper tubing arranged to flex with the movement of the idlers.

Underwater bearings on the sludge-tank conveyors also were included in the system, with the injectors above the surface and copper lines extended down to the bearings to push out coal and water and thus reduce wear.

Rounding out the lubricating facilities in the central plant, all shaker eccentrics are served with oil by a Bowser-built automatic station. Like the greasing stations, it features dual pumps. Service normally is supplied by No. 1 pump, but if the pressure drops 5 lb, No. 2 pump cuts in automatically and failure is signaled on the central control panel.

Oil is circulated continuously by the station. On return, it is heated to 115 F and then run through an 0.005-mesh stainless-steel filter. The cleaning cycle is every 15 min. The shaker oiling system is interlocked so that the shakers cannot be started until the central station has built up a pressure of 25 lb or more. In addition, to guard against loss of service and possible destruction of bearings, the shakers are automatically stopped if the pressure in the system drops to 25 lb during operation.

In line with the importance placed on lubrication, a control panel for each of the centralized lubricant-pumping stations is made a part of the main control panel on the washing floor. Recording charts make a record of the functioning of the greasing system, including both pressure and time cycles. In addition, indicating and warning lights are installed to show if the system is operating and also if any failures should occur. Failure of the pumping equipment, for example, lights a red light on the central panel, which burns steadily for 20 sec, and then starts flashing to make sure that the attendant gets the message without delay.

Installation of the Georgetown lubrication system required over 18,000 ft of supply lines and 14,000 ft of copper feed lines. Filling the system required approximately 2 tons of grease. The system also was designed so that it can be extended and additional outlets added as necessary to take care of any equipment that may be added to the plant in the future. Naturally, this was accompanied by provision for sufficient capacity in the pumping stations and lubrication lines to take care of the added outlets.

LUBRICATION CONTROL

Effective results with lubrication, as with any other activity, require a control system that will provide information on results. At Georgetown No. 12 control is a combination of personal contact, report forms and graphic records.

On the personal side, all equipment, lubrication men and supervisors are regularly visited and consulted by the lubrication engineer to check on results, determine trouble spots and provide any general or specific help that circumstances indicate. Lubrication practices and results also are checked on by the chief electrician, master mechanic and superintendent of machinery, in addition to the members of the "bull gang" charged with the responsibility for regular maintenance and repairs.

Where automatic systems are employed, 24-hr recorders provide charts showing the operation of the systems by individual cycles and pressure, since the latter is a major consideration in insuring that the desired results are being attained.

Lubrication reports are provided

for practically all types of production equipment. These include records which are left with the equipment, such as the log books on the big strippers, the cards attached to portable compressors, and the wall charts used on small shovels, all previously referred to. In addition, a number of daily reports on lubrication are filed with the lubrication engineer. These include reports for the big strippers, for bulldozers, and for road maintainers, all shown in accompanying illustrations, as well as reports on such other equipment as ditchers, etc. The report for the big shovels includes places for both oilers to sign, and also a space for the shovel operator, to whom they are responsible. Space also is provided for listing any trouble spots encountered.

Special reports, such as a report on oil and filter changes for a small shovel, are developed as needed to solve a particular lubricating situation, and are used as long as needed.

Copies of delay and breakdown reports also are routed to the lubrication engineer as a means of focusing attention on repair jobs that may be a result of faulty lubrication.

Personal contact, graphs and reports are backed up by a lubrication laboratory. This laboratory also is used to investigate lubricants that may be suggested for use, check on the qualities of deliveries of types already in use, and determine what has happened to lubricants in service, either as a means of searching out the reasons for failures or to determine when lubricating materials have reached their practicable life and should be discarded.

Laboratory equipment includes the following:

1. A centrifuge to determine water contamination and content of the heavy ends of oil caused by imperfect combustion in gasoline and diesel engines. This, among other things, is a guide to engine condition and to the hours that an oil normally can be used before it must be discarded.

2. A Timken load-testing machine to determine the load-carrying abilities of various lubricants, both new and used. Ability to carry load in a used lubricant is a method of determining its remaining life and consequently how much longer it can be kept in service.

3. A Cleveland open-flash and fire-testing unit for checking flash and fire points of both new and used lubricants.

4. A distillation unit to determine, among other things, the fuel-oil dilution in used oil samples.

5. A Viscosimeter for testing the viscosity of new and used oils.

Additional facilities include equipment for checking gravity and determining ash, as well as apparatus for chemical analysis. As indicated, determination of the remaining life of used lubricants is a major function of the laboratory. This permits discarding lubricants when their effective life limit has been reached, and conversely provides the facts for determining how much longer a specific lubricant can be employed. Otherwise, it might have to be dumped to make sure the equipment was not damaged.

Among other things, analysis of fuel characteristics has an important bearing on lubrication. An increase in sulphur in diesel fuel, for example, would require a change in crankcase oil to offset the added complication in the inevitable dilution experienced in operation.

GEORGETOWN RESULTS

Conventional lubricating methods, particularly those requiring hand work, normally require that the machine be shut down and involve a considerable personal risk in covering the various points of application. And, as a rule, the easy-to-reach bearings are flooded while the hard-to-reach frequently are completely neglected. This results in machine breakdowns, lost production and costly repairs.

Conventional lubricating methods also waste grease. In hand gun application it is estimated that trial shots on the ground and dumping of contaminated lubricants wastes all but perhaps 40 to 50% of the materials purchased.

For these and other reasons the emphasis at Hanna is on correct lubricating procedure, on pumping directly from the original container to the point of use, and on the use of centralized automatic systems wherever possible. With the centralized systems, all bearings automatically receive the right lubricant in the right quantity at the right time. Bearings are kept clean by the exclusion of abrasive and corrosive substances. Dirt, corrosive fumes and moisture are kept from the bearing surfaces by the injection of lubricants while the shafts are in motion. The motion of the shaft tends to distribute the lubricant evenly and maintain a seal at each end of the bearings.

The savings in a program such as that at Georgetown No. 12 are derived from (a) a reduction in the cost of lubricating materials, (b) a reduction in the cost of maintenance, and (3) a reduction in the losses in production time.

What good lubrication means in cost of materials at Georgetown is shown in the following summary:

Year	Tons Shipped	Overall Lubrication Cost Total	Per ton
1944	1,224,649	.....	3.05¢
1948	2,476,166	$75,520	3.05¢
1949	2,509,317	51,463	2.02¢
1950	2,435,130	53,762	2.20¢

The year 1949 marked the completion of training and other preliminaries and the full acceptance of the program by all concerned, with consequent sharp drop in the cost of lubricating materials and lubrication costs. In 1950, with inflationary trends and detachment of the lubrication engineer for other service a large part of the time, it is significant that the low level of costs was maintained, indicating that the program was successful and was being carried out without constant personal attention.

As a matter of fact, the savings noted would have been even greater if weight were given to changes in the prices of materials. From 1944 to 1950, as examples, the average cost of heavy-duty motor oil increased 10¢ per gal; grease, 6½¢ per pound; and drum charges, from $4 to $8.

Maintenance savings, as might be expected, have considerably exceeded the savings in lubricating materials. On stripping equipment it is estimated that the current saving is on the order of $75,000 a year. At the moment, as compared to a few years ago, the "bull" or repair gang is only about one-fourth as large, in spite of a major increase in the number of equipment units in service.

In the operation of the dry preparation plant, as previously noted, the maintenance saving is estimated at $20,000 a year. And in the operation of the new plant it is estimated that if the centralized system had not been installed, four more men would have been required for lubrication instead of one maintenance observer, and still the job would not have been done well enough to avoid heavy maintenance charges.



Find Scrap—

WANT STEEL FOR YOUR MINE OR TIPPLE?

Want our factories to build more tanks and guns?

Want our steel industry to keep on being the biggest and strongest in the world?

Want to do your duty as a citizen?

Want to clean up your mine and shop? Find more room for work space and storage? Make a few bucks out of junk and litter?

Clean up the iron and steel scrap on your property and sell it to a scrap dealer. That way, you'll accomplish all these things.

The Nation's steel mills need scrap desperately. Some of them are down to a 10-day supply; others are still lower. To be on the safe side, they need at least a 6- to 8-wk inventory. If they don't get the scrap they need, you don't get the steel you need—nor do the electric utilities, the railroads, the makers of tanks, guns and trucks for the men in Korea.

How Steel Mills Use Scrap

TO MAKE STEEL IN AN OPEN HEARTH, a mill needs a charge of half scrap and half pig iron.

The steel makers could use 100% pig iron for a charge. But if they did, output would be low. Scrap is the key to high tonnage. It speeds production because it cuts down the percentage of unrefined material in the charge. There's that much less work for the open-hearth furnace to do. Besides, every ton of scrap takes the place of four tons of other materials—coal, limestone and iron ore—needed to make pig iron.

Since about 90% of the Nation's steel is made in open hearths and since they use some 80% of all the scrap consumed by steel mills, you'll be helping where help counts most when you send in your scrap.

Scrap is needed for other kinds of steel mills also. Take electric furnaces, for instance. Their charge always is 100% premium heavy-melting scrap steel. They produce the kinds of steel that now are in critically short supply—high-quality alloys, stainless steel and tool steel. They take 10 to 13% of all the scrap used by the steel industry. Without scrap, they can't operate at all.

If you can't get the stainless steel you need for shaker screens or chutes, could it be because you haven't gathered up your steel scrap and sold it?

Big Scrap Tonnage Needed

THE STEEL MAKERS CAN'T GET ALONG even now on less than 3,000,000 tons of scrap per month bought from outside sources, such as your mine.

But if steel capacity and production keep on moving up, even 3,000,000 tons of scrap each month won't be enough later in the year. Capacity in 1951 was close to 107,000,000 tons of semi-finished and finished steel. To make that much, the industry used nearly 36,000,000 tons of scrap bought on the outside. By the end of 1952, the target for semi-finished and finished steel capacity is 117,000,000 tons. That means a still bigger need for scrap in the year ahead.

Why Scrap Is Short

SCRAP IS IN SHORT SUPPLY for several reasons. Among them are the following:

1. Steel mills are using it at a fast clip to keep their output high. In 1950, they used 29,500,000 tons

Get More Steel

of purchased scrap; in 1951, close to 36,000,000 tons. Those are the highest figures in history.

2. Other countries are bidding against us for foreign scrap in the world markets. They need it because steel output everywhere has moved to new high levels. In 1950, we imported only 760,631 tons—a mere drop in the bucket and some 360,000 tons less than in 1949.

3. During World War II we shipped between 110,000,000 and 125,000,000 tons of steel abroad. If it had been used in this country, it now would be coming back to the mills as scrap. But it's overseas now, hard to get and costly to ship back.

4. The scrap shortage really is worse than lots of people know.

What Is Scrap?

SCRAP IS ALMOST ANYTHING made from steel.

Right now, the steel makers are looking mostly for heavy industrial scrap that's dormant—that is, lying around unused, cluttering up the place and cutting down efficiency. It includes obsolete machines, tools, jigs, dies, fixtures, mine cars, shaker screens, rails, pumps, chains, motors, fans and other equipment you'll never use again. It also includes banged-up equipment that's broken or worn beyond repair, abandoned, junked, dismantled or out of service because replacement parts aren't made any more.

How You Can Help

HERE'S WHAT YOU CAN DO to help in the scrap drive:

1. Put a tough man from your company's top level in charge of scrap collection.

Give him authority to: (1) write off whatever he thinks should be written off; (2) haul out old machines, motors, pumps, rails, mine cars, machine tools, wire rope and other items that have outlived their usefulness; (3) make regular inspection tours of your properties to keep scrap flowing; and (4) set up collection points for small scrap like machine cuttings, leftovers from roof-bolt plates, punchings from screens, bent rail spikes and worn nuts and bolts.

Give him good men to work with.

Back him up with everything in the book—articles and displays in your company magazine or newspaper, posters for your bulletin board and stuffers for pay envelopes.

2. Go after the scrap on your property.

Start with a clean-up drive to root out obsolete, banged-up, wornout and unrepairable machines, tools and equipment. Tag them for haulage to the central collecting station. You'll get lots of scrap that way.

Then, when you've cleaned up the obvious things, put scrap salvage on a housekeeping basis and settle down with an even flow to the steel mills. The steady flow is what counts in the long pull.

3. Contact a scrap dealer and sell your scrap to him.

Scrap dealers are in on the campaign, too, along with farmers, manufacturers, railroads, maritime shippers, other private groups and government agencies. When you've settled down to an even flow of scrap from your property, set up a collection schedule with your scrap dealer. That's the way Valley Camp does it: "We have designated spots at each of our mines where scrap metal is collected after it is brought out of the mines. Two or three times a month a scrap dealer hauls it away."

Your scrap dealer will pick it up and pay you the going price for it. It'll be a tidy sum.

4. Spur your neighbors.

There's a lot of scrap steel lying around on farms, in factories and foundries, in shops and garages run privately or by local and state governments. If you keep your eyes peeled, you'll see it as you drive back and forth between home and the mine. Stop in some day on the owners and tell them what you know about the scrap shortage.

You can help also if you'll pass the word along in your local operators' association.

What You'll Gain

HERE ARE SOME OF THE GAINS you can look for if you do your part in the scrap drive:

1. More finished steel on the open market.

2. Cleaner, safer mines and shops, plus more storage space for the things you really need to keep on hand.

3. A final write-off (for tax purposes) for machines and equipment that are no longer useful.

4. A little extra cash for buying replacement items.

5. More guns, tanks, planes and ships for men in uniform.

6. A stronger steel industry and a stronger Nation.

7. The inward satisfaction that comes when you do your duty for your country.



To keep steel coming, Valley Camp "mined" 593 tons of scrap.

VALLEY CAMP COAL CO. found out that scrap is where you find it, if you look for it.

Here's what that company did at its mines and plants near Wheeling, W. Va.:

Searchers and savers turned up 593 tons of scrap in a 9-mo period—443 tons in the first 6 mo, which included a high-pressure clean-up drive, and 50 tons a month for the next 3 mo, after the cream had been skimmed off. From here out, normal wear and tear on machines and equipment is expected to keep the rate close to 50 tons a month, company officials say.

Most of Valley Camp's scrap is old rails and obsolete machines, tools and maintenance equipment that passed out of usefulness when new production methods and practices moved in.

One result is cleaner, safer mines and shops.

Another result is a tidy sum in the company till that helps pay for replacement of broken parts and obsolete machines and equipment. A company official explains that scrap collection used to cost more than it paid but now, with good prices for scrap, it's "better than a break-even proposition."



ANTHRACITE, cleaned to better-than standard specifications, flows over the discharge weir of the new cleaner . . .

How Difficult Anthracite Is Prepared by . . .

Dual-Density Cleaning

New dual-gravity heavy-density unit yields near-perfect results with hard-to-clean feed at Indian Head

By H. J. DANIELS, President, H. J. Daniels & Co., Inc., Hazleton, Pa.
and HAROLD DAVIS, Assistant Editor, Coal Age

NOW PROVIDING unusual results with a hard-to-clean feed, a Roller heavy-density unit was installed in the preparation plant of the Indian Head Coal Co., Tremont, Pa., in record time in the summer of 1951. The results reflect sound planning and careful engineering, and indicate a practical and technological advance in heavy-media practice.

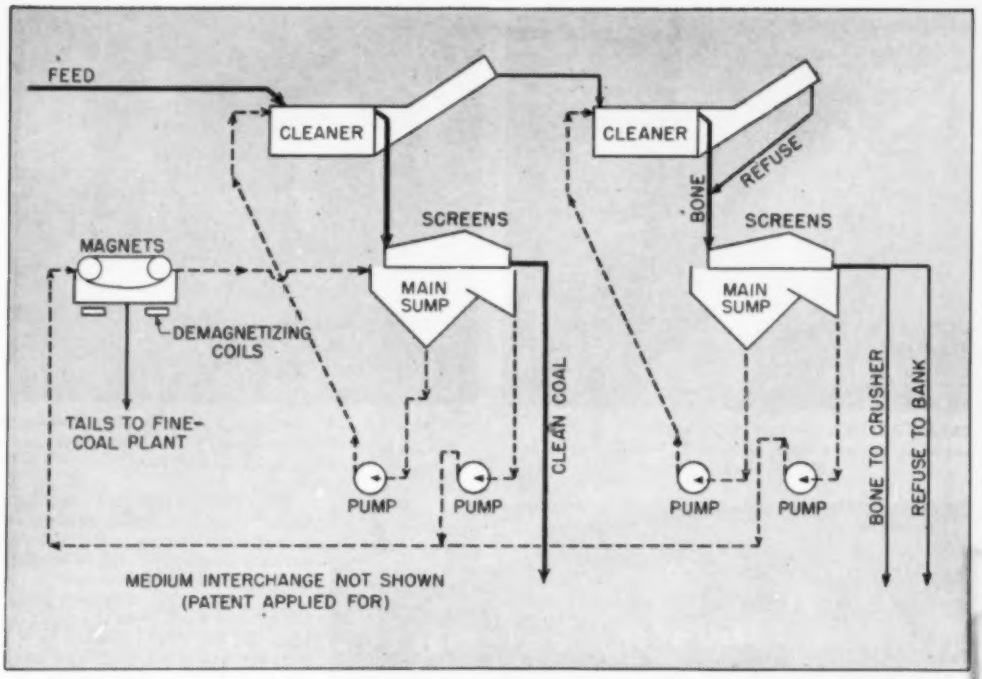
The Roller unit is tailored to its job of preparing Indian Head coal from run-of-mine, now consisting of raw coal from deep mines and strippings and later to include bank material. It is consistent only in the uniform difficulty of preparation, since it is considered to be one of the most difficult problems in anthracite cleaning practice. Table I is a typical analysis of the feed entering the breaker.

From this feed, the Roller unit is producing an excellent product with no loss of coal to the refuse bank. The consistently good results reflect constant maintenance of the specific gravity of the bath—a distinct forward step.

The steadiness of gravity readings, as shown in Table III, is notable because the two circuits are interlocked and operated at different gravity levels, and the feed varies from a trickle to nearly 200% overload with no apparent effect on the quality of the products.

This performance is made possible by the Roller cleaner, perhaps the first machine deliberately designed to eliminate interference currents in heavy-density processing, and by the use of efficient pumps and magnetic separators and the elimination of cleaning-circuit accessories such as densifiers, thickeners, underflow and overflow pumps, magnetizing blocks and so on.

Early in the spring of 1951, H. J. Daniels & Co., Inc., Hazleton, Pa., heavy-density preparation consultants, were called upon by officials of Indian Head Coal Co. to revise the company's plant at Tremont. The outcome was the Roller dual-gravity heavy-density unit illustrated in the flow diagram on the opposite page.



. . . **AFTER TREATMENT** in the simplified dual-gravity heavy-density circuit shown in the flow diagram.

DUAL GRAVITIES USED

Feed to the unit ranges in size from egg to buckwheat, or from 3¼ to 5/16 in, in quantities from 250 to 350 tph, and is taken directly from Parrish-type shaking screens. The first separation is made at a gravity of 1.65 and the finished coal which flows over the weir of the primary vessel is drained and rinsed on two vibrating screens mounted in parallel rather than in series.

Material which sinks at 1.65 is delivered without intermediate handling to a second unit for separation at a gravity of 1.71. Table II gives analyses of the products of both separations, and efficient cleaning is reflected in a rising demand for Indian Head coal.

As shown in Table II, the percentages of near-gravity material cover a wide range and the bone content usually is high. Despite the fact that the specific gravity of the primary bath is held low enough to cause bone coal to appear in the secondary float material, the passage of coal from the primary bath to the secondary bath is almost non-existent.

The separatory vessel of the Roller cleaner consists of a rectangular tank with steeply sloping sides, a heavy-media-type feed trough, a new type "float" weir, a slow-moving "sink" conveyor and a new system of medium circulation. The passage of medium through the cleaner is smooth and steady regardless of feed and discharge conditions, and flow over the weir is similar to the flow of water over a dam. There are no

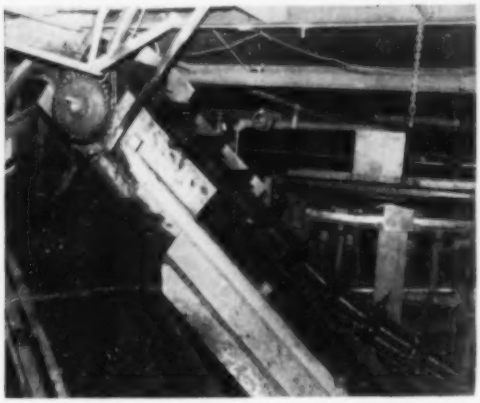
Table I—Indian Head Feed

Specific Gravity	Percent Weight	Ash, Percent
Float, 1.50	32.35	7.68
1.50–1.60	29.80	13.90
1.60–1.65	6.35	24.06
1.65–1.70	3.58	30.50
1.70–1.75	2.68	35.20
1.75–1.80	2.20	37.80
Sink, 1.80	22.65	75.64



INDIAN HEAD PLANT, recently converted to heavy-media operation, strips all the values out of southern-field anthracite.

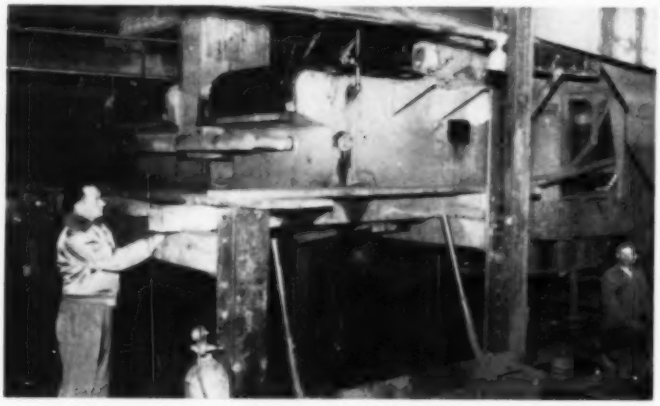
How new Indian Head unit performs with hard-to-clean anthracite . . .



CLEAN REFUSE, the sink of the secondary separation, is conveyed to waste chute after being washed free of magnetite on vibrating screen.



TOM MAHER (left), foreman; Ray Kreis, plant operator; Frank Moran, supt., Indian Head; W. L. Roller, chief engr., Daniels, shown at the Indian Head plant.



MAGNETIC SEPARATORS reclaim magnetite from the wash water used on the products of the cleaning vessel. Separator underflow goes to a fine-coal plant.

swirls or eddy currents and since a portion of the incoming medium is directed upward through the bedded sink material the entrapment of float parts is eliminated.

THE CLEANING CYCLE

Raw feed enters the Indian Head plant via a flight conveyor which discharges to a nest of shaker screens. The spray-water arrangement over these shakers was revised, and bar screens were installed in the feed chute to the cleaner to limit the water accompanying the feed to surface or skin moisture.

As the feed enters the primary cleaner it is submerged below the surface of the medium bath. The bulk of the separation takes place in the first 24 in of travel, while float coal entrained during periods of heavy feed is quickly released and directed over the weir by the unidirectional medium flow.

The coal produced by the primary cleaner flows over the weir and down a gathering chute lined with wedge-wire screen sections. These are equipped with alternate high bars which act as rails for the passage of large lumps of coal and greatly increase the life of the actual wedge-wire screening surface. The wedge-wire bottoms drain about 65% of the medium from the coal. The remaining free-draining medium falls through the first sections of two 5x12-ft vibrating screens and joins the wedge-wire product in the main circulation sump. From this sump all circulating medium is returned to the Roller cleaner by an efficient medium pump.

The portion of the medium which does not drain readily is rinsed from the coal over the remaining surface of the vibrating screens by only eight sprays.

To continually eliminate contaminating fines from the separating bath, the rinsed medium is fed to three wet-belt type Dings magnetic separators which return cleaned medium to the main circulation pump at a density of from 2.00 to 2.35.

FINAL RECOVERY

The material which sinks in the primary cleaner is removed by a conveyor and, without intermediate handling, enters the secondary cleaner where the operation is repeated at the higher gravity. The secondary cleaner produces a clean refuse and a bony middling which is crushed and returned to the plant feed conveyor. Thus, the final product, in egg-to-buckwheat sizes, is produced by the primary cleaner. Since the system of medium interchange which makes the dual-gravity circuit possible is reserved by the holder of the process, no attempt is made here to describe it.

Magnetite consumption at Indian Head is normal for heavy-density operations. In view of the fact that the medium reclamation screens are installed in shorter-than-normal length to take advantage of stock deliveries and that two vessels are involved, it appears that the Roller cleaner will be one of the lightest consumers of magnetite.

Automatic density recorders for both primary and secondary circuits now are being installed.

Table II—Heavy Density Float-Sink Test Results (October, 1951)

Test	Primary Float	Primary Sink, Percent			Secondary Float, Percent		Refuse to Bank, Percent	
		Coal	Bone	Rock	Coal & Bone	Rock	Coal	Bone
1	S. A.*	2	3	95	19.5	80.5	0	0.5
2	S. A.	0	5	95	40	60	0	4
3	S. A.	1.5	9	89.5	72	28	0	2.5
4	S. A.	3	4	93	56.75	43.25	0	3.5
5	S. A.	2.5	5	92.5	43	57	0	2
6	S. A.	2	3	95	48	52	0	1.5
7	S. A.	0	4	96	51	49	0	0
8	S. A.	0	4.5	95.5	57	43	0	1
9	S. A.	0.5	3.5	96	73.5	26.5	0	3.5
10	S. A.	...	...	...	...	...	1.0	3
11	S. A.	...	...	...	...	...	0	2
12	S. A.	...	...	...	...	...	0	5
13	S. A.	...	...	...	...	...	0	2.5
14	S. A.	...	...	...	...	...	0	4.5
15	S. A.	...	...	...	...	...	0	2
16	S. A.	...	...	...	...	...	0	2.5
17	S. A.	...	...	...	...	...	0	1
18	S. A.	...	...	...	...	...	0	0
19	S. A.	...	...	...	...	...	0	1.5

* Indicates coal produced well within anthracite standards.

Table III—Specific-Gravity Determinations for a Typical Shift

Time	Primary Circuit Cleaner	Primary Circuit Separator Return	Secondary Circuit Cleaner	Secondary Circuit Separator Return
7:00	1.67	....	1.72	....
7:30	1.68	2.30	1.72	2.24
8:00	1.68	2.24	1.72	2.24
8:30	1.68	2.26	1.71	2.22
9:00	1.68	2.22	1.71	2.24
9:30	1.68	2.27	1.72	2.21
10:00	1.68	2.24	1.72	2.28
10:30	1.68	2.23	1.72	2.22
11:00	1.68	2.22	1.72	2.18
11:30	1.68	2.21	1.71	2.18
12:00	1.68	2.22	1.72	2.13
12:30	1.68	2.18	1.72	2.17
1:00	1.68	2.18	1.72	2.17
1:30	1.68	2.13	1.72	2.18
2:00	1.68	2.13	1.72	2.18

INDIAN HEAD RESULTS

Tables IV and V show a comparison of coal produced at Indian Head before and after the installation of the Roller unit, based on the company inspector's reports.

Table V, which gives results of gravity determinations during a typical day's run, shows the steady nature of specific gravities in the primary and secondary cleaners and in the medium returns from the magnetic separators. At the time of the test, primary vessel gravity was 1.68.

The plant, as noted, was designed by H. J. Daniels & Co., Inc., the originators of the Roller unit. Magnetic separators were furnished by Dings Magnetic Separator Co., pumps by Barrett, Haentjens & Co., vibrating screens by Allis-Chalmers Mfg. Co., dry medium feeders by Syntron Co., and stationary screens by Wedge-Wire Corp.

Louis J. Pagnotti, president, Indian Head Coal Co., made the decision to convert to the new cleaning process, and his generous cooperation made the development possible. Assisting Mr. Pagnotti and Daniels' engineers during the installation and break-in period, and contributing materially to the success of the installation were: W. H. Lewis, chief engineer; and Frank Moran, colliery superintendent; and other members of the Indian Head Coal Co. staff; and Ralph Tobert, Dings Magnetic Separator Co.

BEFORE CONVERSION TO DUAL DENSITY

Table IV—Performance of Original Equipment*

Test No.	Egg		Stove		Nut		Pea		Buck	
	Slate	Bone	Slate	Bone	Slate	Bone	Slate	Bone	Slate	Bone
	Percent in coal product									
1	1.0	2.0	1.5	1.5	...	...	2.5	2.5	2.5	...
2	1.5	2.0	1.5	2.0	2.75	3.0	2.0	2.25	4.75	...
3	1.25	1.75	1.5	1.75	1.75	2.25	2.0	2.25	5.0	...
4	1.0	2.0	1.5	1.75	2.0	2.75	1.75	2.25	5.0	...
5	1.5	1.5	1.5	1.75	2.0	2.5	1.75	2.25	5.0	...
6	1.5	2.0	1.5	1.75	1.5	2.25	1.75	2.25	4.25	...
7	1.0	2.0	1.5	1.75	2.0	2.25	1.75	2.25	4.75	...
8	1.25	1.5	1.25	1.5	2.25	2.5	2.25	2.25	5.0	...
9	1.5	2.0	1.25	1.75	1.75	2.25	2.0	2.25	5.25	...
10	1.5	1.5	1.25	1.75	1.75	2.0	2.25	2.5	5.25	...

* Data from coal inspector's daily reports.

AFTER THE CHANGE

Table V—Performance of New Heavy-Density Plant*

Test No.	Egg		Stove		Nut		Pea		Buck	
	Slate	Bone	Slate	Bone	Slate	Bone	Slate	Bone	Slate	Bone
	Percent in coal product									
1	0.0	0.5	...	...	0.5	1.0	0.5	2.0	2.5	...
2	0.0	0.5	...	...	0.25	1.0	1.0	1.5	2.5	...
3	0.0	0.5	0.0	0.5	0.25	0.75	0.25	2.0	2.5	...
4	0.0	0.25	0.0	0.75	0.25	1.25	1.5	3.75	2.5	...
5	0.0	0.5	0.0	1.0	0.25	1.25	0.5	2.0	3.0	...
6	0.0	0.5	0.0	0.75	0.25	1.0	0.5	2.0	3.0	...
7	0.0	0.75	0.0	0.75	0.25	1.25	0.5	1.75	3.0	...
8	0.0	0.75	0.0	0.75	0.5	1.75	2.25	4.25	3.5	...
9	0.0	0.5	0.0	0.75	0.75	2.0	2.0	4.5	4.5	...
10	0.0	0.75	0.0	0.75	0.5	1.25	1.0	2.75	3.0	...

* Data from coal inspector's daily reports.



Cutter-loader simultaneously cuts, back-shears and loads to belts on longwall faces in coal 3 to 6½ ft thick in Great Britain



Mining With the Cutter-Loader

How Great Britain uses the cutter-loader, scheduled for early trial in the U. S., to boost efficiency, as shown by results at Thoresby colliery

By M. C. POTTS, B.Sc., F. R.(Met.)S.
Mining Research engineer
East Midlands Div.
National Coal Board
Great Britain

CUTTER - LOADERS producing from coal 4 to 5 ft thick have proved their ability to raise tons per man to the loading point to averages of more than 8.47 at Thoresby colliery of Bolsover Colliery Co., Ltd., in the Sherwood Forest area of Great Britain. A second major benefit of mechanization with cutter-loaders operating on longwall faces and discharging to face belts has been a substantial increase in over-all output per man-shift. A third has been reversal of the previous downward trend in colliery output.

Sinking operations at Thoresby colliery began Sept. 29, 1926, and the Top Hard seam—5 ft 7 in thick, including about a foot of Coombe coal—was reached April 25, 1928, at 1,746 ft. The shafts subsequently were carried down to 1,905 ft. As a part of a major reorganization program carried out in the past 5 yr in conjunction with mechanization of the working faces, the shafts have been deepened to 2,262 ft. Bottom-discharge skips holding 11¾ tons are now loaded at 2,103 ft by a 48-in feeder belt from a mine-car dump on the diesel-haulage level.

Keeping step with the reorganization of the underground workings, considerable reconstruction is taking place on the surface. Main additions to date are the canteen, pithead baths, explosives magazine and medical center. The reconstruction at the skip-shaft top will be extended to the screens in the preparation plants.

Coal over 4 in is hand-picked and sized to 4x6, 6x8 and 8 in plus. Coal under 4 in is screened to 4x2½, 2½x1½ and 1½x½ and cleaned in Norton wash boxes, with minus ½-in going to a separate Simon-Carves washery. The 1½x½ fraction is rescreened after washing to 1½x1 and 1x½ for loading.

BEFORE—Declining Manpower and Productivity Pull Down Output at Thoresby Colliery

TABLE I

	Salable Output, Tons	Total Manpower	Over-all Output per Man-Shift, Cwt	Output per Wage Earner, Tons
1943	1,021,518	1,455	45.94	702.07
1945	925,630	1,413	43.75	655.08

AFTER—How Power Loading Turned the Tide

TABLE II

	Total Salable Output, Tons	Mechanically Output, Tons	% Total Mechanically Loaded	Total Manpower	Over-all Output per Man-Shift Cwt	Output per Wage Earner, Tons
1950	928,992	699,148	75.26	1,628	38.73	570.63
1st 14 wk, 1950	238,867	172,935	72.40	1,656	35.59	144.24
1st 14 wk, 1951	318,502	253,217	79.50	1,625	49.46	196.00

POWER-LOADING DEVELOPMENT

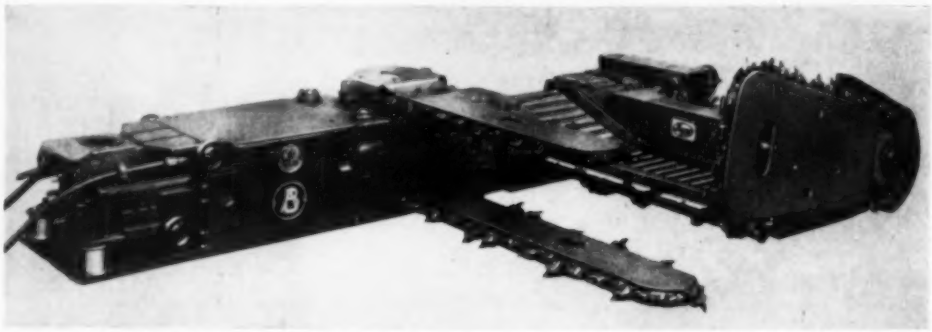
The end of the war found Thoresby colliery facing a serious reduction in the output of salable coal, reflecting both declining manpower in the mines and decreasing output per man-shift. The extent of the decrease in 1945, as compared to 1943—a typical war year—is shown in Table I.

It was clear at the end of the war that immediate steps were imperative to halt the downward trend in output. In the early war years, Bolsover, in cooperation with the manufacturers, had carried out numerous tests with Meco-Moore cutter-loaders at one of the company's collieries. Actual operation had produced considerable modification in design, and by the end of the war, the machine, which was still developing, had operated with a sufficient measure of success to warrant installation elsewhere. Bolsover originally installed the machine in the Top Hard seam at Rufford colliery, and carried out extended trials with a redesigned machine at Clipstone colliery, also in the Top Hard seam, before introducing it into Thoresby, also producing from the Top Hard.

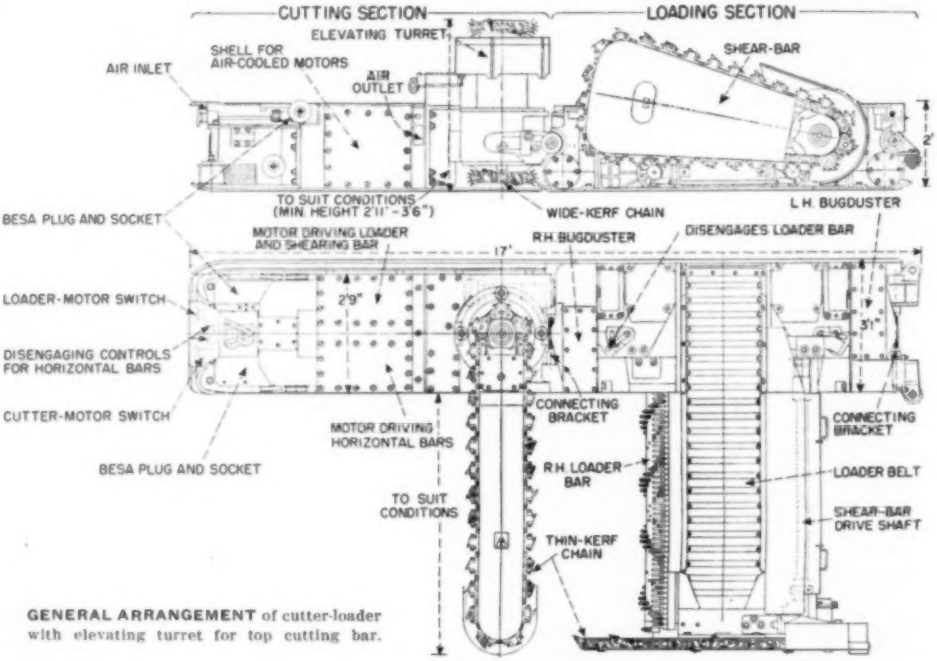
The first machine went into operation at Thoresby in 1945. As shown in Table I, power loading steadily replaced hand methods in the succeeding years. At present, two high and seven low machines are handling about 83% of the total mine output.

The downward trend in over-all output per man-shift continued until the middle of 1950. The reason for this apparent worsening of the production position was that a relatively high percentage of the total manpower was employed, during the postwar period, on the reorganization scheme, including the introduction of power loading. By the end of 1950, the full effect of underground haulage reorganization was reflected in the production figures. Table II shows the improvement resulting from the effect of concentrated and highly mechanized mining based on Meco-Moore face operation.

The story of the development of power loading at Thoresby was scheduled to be complete in Au-



LOW-TYPE CUTTER-LOADER from the face side showing cutting section with two horizontal bars and loading section (right) with shearing bar, rotary loading bar and loading belt.



GENERAL ARRANGEMENT of cutter-loader with elevating turret for top cutting bar.

gust, 1951, with the installation of two additional machines to bring Meco-Moore output up to 100%.

MINING CONDITIONS

The best results with the A.B. Meco-Moore cutter-loader are obtained where certain natural conditions strongly prevail. Some of these are:

1. A seam not less than 3 ft thick.

2. A reasonably good roof and floor. Usually, however, it is found that roof conditions improve when the machine is in regular use.

3. A well-cleated coal and a good roof parting for the normal application. With other conditions, special methods must be used.

4. An "end-on" face if at all possible, as this usually provides the best and most-consistent loading conditions in both directions of travel. Faces have and are being worked quite successfully with different angles of face line, but trouble may be experienced in getting the coal to break away when cutting against the cleats.

5. A grade along the face normally not in excess of 20%, and about 5% in the direction of advance is to the dip.

6. A system of packing, chocking and timbering that will provide efficient control of the roof and keep sufficient pressure on

Two-way Operation on Longwall Faces Provided by Cutter-Loader Design

THE DEVELOPMENT of the A. B. Meco-Moore cutter-loader has been a great pioneering effort in longwall working, and the success achieved has established the value of mining and loading the coal in one simultaneous operation.

Development still cotinues. Therefore it is not possible to discuss application and operation with finality. In addition, owing to the wide range of mining conditions and consequent variation in application details, it is difficult to cover every phase within the limits of a single article. An attempt will be made, however, to present the construction and general principles of the machine, together with some thoughts on application as a result of extended experience. More details on the various problems are included in the several papers on the subject listed at the end of this article.

Development of the Meco-Moore cutter-loader goes back to 1930, when the inventor, the late M. S. Moore, and the Mining Engineering Co., Ltd., started on the design and production of machines for alternate cutting and loading on longwall faces, and later for simultaneous cutting and loading. It was not until the war years, when it was necessary to increase production, that the machine really came into its own. As a result, in 1941, the Mining Engineering Co., Ltd., and Anderson, Boyes & Co., Ltd., began close collaboration when they got together, with the Bolsover Colliery Co., Ltd., as members of the Power Loading Committee of the Ministry of Fuel and Power to see what could be done to develop the principle of simultaneous cutting and loading.

After careful investigation and deliberation, there was produced a redesigned machine for simultaneous cutting and loading arranged to work to and fro on a longwall face. This machine, illustrated elsewhere in this description, consists of two sections—cutting and loading—which are coupled together.

The cutting section includes the motors, haulage gear and horizontal top and bottom cutting bars. Two 60-hp specially constructed sleeve-type AC motors supply power for all operations through suitable gearing, clutches, etc. One motor drives the two horizontal bars and the haulage gear. The other drives the loading unit and shearing jib or bar, which shears the coal loose at the back of the cut.

A special gearhead can be provided for hydraulic adjustment of the height of the top cutting bar to permit roof cutting in accordance with all normal working heights. Adjustment ranges are 7 in for the low-type turret, 9 in for the intermediate, and 12 in for the high.

The haulage gear for moving the machine back and forth across the face provides, through double-rope haulage, a fast or tramming speed, and a low or cutting speed. The latter is adjustable by means of a ratchet feed. The large-diameter drum will take 135 ft of 5/8-in wire rope. With double-rope haulage, maximum cutting speed normally is 27 to 30 in per minute. Necessary pulleys for bar slewing and the like are included in the haulage unit.

The loading section comprises right- and left-hand bugdusters and a loader structure or boom including right- and left-hand loader bars, a loading belt and, at the end of the boom, the shearing bar. Since the machine is designed to work in each direction of travel, the loading unit is arranged symmetrically around the center line of the loading belt so that the cutting unit may be attached to either end of the loading unit, depending on travel direction.

Duplicate screw-type bugdusters remove cuttings from the bottom bar of the cutting unit and place them on the face belt. They are used alternately in accordance with direction of travel. To permit the bugdusters to function, a bottom-belt face conveyor or some other arrangement with a structure height not exceeding 7 in is necessary. Past experience has clearly indicated that the best results from a loading point of view are obtained with a bottom-loading conveyor.

In operation, as the machine is pulled along by the haulage gear, the coal is cut by the two horizontal bars and sheared loose at the back by the shearing bar. The shearing bar, triangular in shape, can be adjusted 4 to 5 in vertically, and is driven through a detachable shaft.

As the coal is cut and sheared, one or the other of the two loader bars, depending upon travel direction, comes into service. These rotating loader bars are equipped with picks passing through combs on either edge of the belt frame. They serve two purposes: (1) picking broken coal off the floor and (2) lifting standing bottom coal and breaking it up into suitable sizes for loading.

The loading belt is a 3-ply endless rubber belt to which steel slats are riveted. A roller chain runs along each side of the belt and is connected to the slats through lugs. Thus, the belt serves only as a carrier, with the load transmitted through the slats to the chains. A screw conveyor at the rear end of the belt removes fines which tend to pack the belt and discharges them into the main bugduster. A multiplate clutch protects the belt against damage or breakage. The tail portion of the loader structure, or boom, can be varied in length in accordance with the depth of cut desired.

the solid coal to make it work. Roof and floor conditions should be carefully studied to assure this.

The cutter-loader has been developed on single-unit faces of such length that the distance between the two stables can be conveniently loaded out in a shift. Depending upon conditions, face length can vary within wide limits. However, normal varies between 390 to 450 ft. The single unit with single-shift loading is simple and is to be commended for an initial installation. Double-unit layout is more complicated, especially with regard to the conveyor problem, but, where conditions are right, has many advantages.

CUTTER-LOADER APPLICATION

1. Normal Layout. The simplest layout for cutter-loader mining consists of a single face on which the machine travels alternately back and forth (Fig. 1). The coal is cut by the two horizontal bars, one at the floor and the other at some predetermined height in the seam—usually near the middle—with shearing at the back of the shearing bar.

The cutting chain of the upper horizontal bar travels in the opposite direction to that of the lower bar. The resultant twisting action tends to break down the coal. The loader bar carries the broken coal onto the loading belt and also

Modified plans meet variations in coal and roof conditions

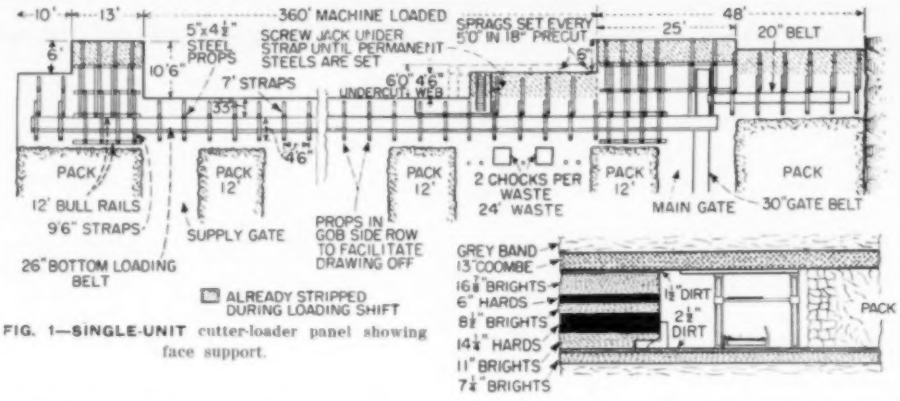


FIG. 1—**SINGLE-UNIT** cutter-loader panel showing face support.

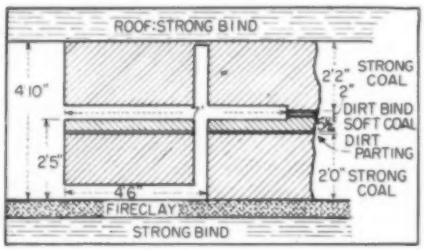


FIG. 2—**LIMITED PRECUT** with upper bar.

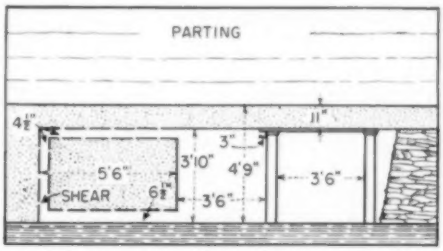


FIG. 3—**SIMULTANEOUS CUTTING** of roof and floor.

assists in breaking up the coal between the two horizontal cuts. At the end of each loading shift, the cutter-loader is turned in a stable—one at each end of the face—and then is prepared for the next cycle.

With this type of installation, breaking down of the coal is dependent to a large degree on roof pressure and the cutter-loader is not assisted by other facilities. Experience has shown that seams tackled in this way should have a definite parting between roof and coal, with no tendency to ingrowth between the two. If the parting is free of such ingrowth, it has been demonstrated that production can be facilitated by careful adjustment of the lengths of the horizontal bars and the height of the upper bar.

By extending one or the other of the horizontal bars beyond the shearing bar, a limited precut is obtained (Fig. 2). This has very important effects in several directions, depending upon the character of the coal. In many instances, it will reduce the likelihood of a roof break at the edge of the coal, and at the same time will induce parting of the coal from the roof to some degree as a result of minute movement. A further influence is to induce fractures in the coal parallel to the face so that the coal breaks down more freely during operation. In addition, a middle precut has been beneficial where a floor tends to heave and break at the bottom of the coal. The break may be completely eliminated and the extent of floor heave close to the face reduced.

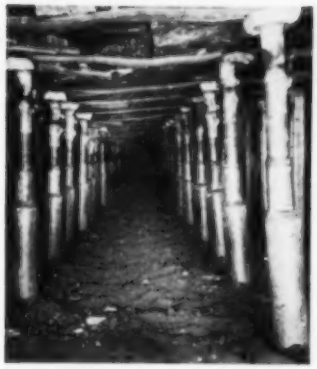
Use of a long bottom or middle bar for precutting is a common practice, and choice depends greatly upon the thickness, nature and strength of the coal in conjunction with roof and floor conditions. Experience seems to indicate that it is most beneficial to extend the upper bar. All experimental work in this direction should be given careful study. In every instance, also, sprags should be inserted in any precut used.

2. Simultaneous Roof and Floor Cut. Where other loading conditions are normal, it may be found that the roof parting is poor or that top coal must be left up to support a bad top. Under such conditions, the upper bar may be raised by the hydraulic turret to cut at roof level (Fig. 3). With such an arrangement, it will be realized that in the thicker seams the coal must be especially well cleated or have an inherent "liveliness" that will assist in breaking it down into loadable lumps as the cuts are made. Provision also must be made for lowering the upper bar to permit turning in the stables, or the roof coal must be taken down to provide the necessary height after allowance for the special roof bars required.

3. Precut With Separate Machine. Under certain circumstances it has been found necessary to make a full precut on a cutter-loader face before loading commences; for instance, where a roof parting has to be cut and some shooting or bursting is required.

The precut may be made by an orthodox overcutter followed by use of a hydraulic burster or light shots. Then, the coal would be loaded by the loader-cutter in the usual manner, using the bottom-cutting and shearing bars, plus the upper bar if seam thickness should warrant it.

Alternatively, the precut may be made in the middle of the seam using a standard overcutter. This



COAL FACE left by cutter-loader, showing clean floor and prop lines.

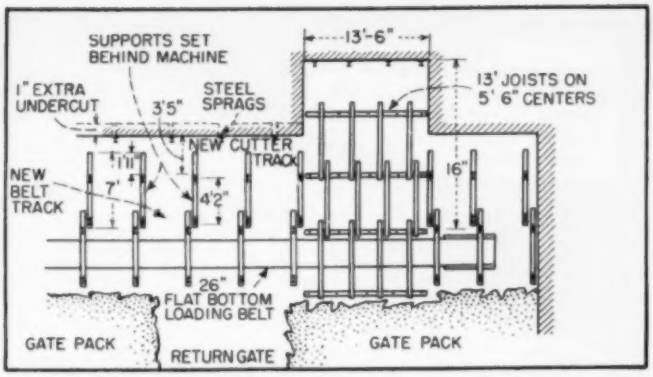


FIG. 4—STABLE ARRANGEMENT and timbering as cutter-loader completes left-to-right cut.

might be done where the roof parting is sticky but where separation can be secured by light shots. In such an event, the upper bar of the cutter may be dispensed with even in a thick seam. With either of these methods, the precutter also is available for cutting stables.

DOUBLE-UNIT OPERATION

Power loaders at Thoresby colliery operate on advancing longwall faces. One face, or two advancing together, may constitute a panel. The considerable advantages of double-unit panels with two faces are the major factor in selecting this rather more complicated layout where conditions are suitable.

Since the length of each face is determined mainly by the travel of the Meco-Moore along the face over the duration of the shift, double-unit operation is more economical in labor employed in stable preparation and construction of gate roads. Under certain conditions, where difficulty is encountered in gate-road maintenance, it may be better to provide these roads with the rib-side protection afforded by single-unit operation.

A 24-hr cycle is perhaps the best for successful Meco-Moore operation. On double-unit panels, a 48-hr cycle may have certain merits—in reducing, for example, the number of stables required for a given output. However, these are outweighed by the major disadvantage of doubling the number of panels for required daily output.

With a 24-hr cycle, each double-unit panel requires two machines with three stables. Both machines travel in the same direction along the face, one commencing at one end and working to the middle stable, and the other commencing at the middle and working to the other end of the face.

Labor Force—The division of face operations into shifts with a 24-hr cycle usually is as follows:

First shift (morning), 7 am-2:30 pm—loading coal, timber setting, stable preparation.

Second shift (afternoon), 3-10:30 pm—gate ripping, packing, conveyor shifting, turning and examining cutter-loader.

Third shift (night), 10:30 pm-6 am—maintenance and final preparation of the face for the loading shift.

The loader crew normally consists of:

One operator.

One assistant to help with cable, jack setting and track cleaning.

Two setting temporary supports, breaking lumps in the loader, cleaning up and attending loader generally.

Two setting permanent supports.

Additional employees on each coal-loading shift for each loader are:

Two or 3 preparing each stable.

Two bringing up timber.

One operating face-conveyor motor.

One foreman.

Thus, a total of 15 or 16 men are employed instead of the usual force of loaders, cutters, shotfirers and drillers totalling 25 or 26 men required with hand loading. The afternoon and night-shift forces are substantially the same for both power and hand loading.

Stable-Making—A stable is required at each end of the face (Fig. 1), and the stable to which the machine is traveling must be driven two cuts in advance of the face and completed before arrival of the machine. A stable about 15 ft wide normally is required to turn the machine, but local conditions may make it necessary to hand-load a greater length at the loader-gate end. The stable at the tailgate end usually is next to the rib side. In some instances, however, it will be beneficial, because of roof conditions, to keep it a few yards away from the rib. If so, the stretch of coal left should be worked forward in line with the main face.

A coal cutter usually is provided in each stable—standard longwall at the loader-gate stable; small shortwall or longwall at the tailgate stable. The men employed in the stables do all the cutting, drilling, loading and timbering. In suitable seams, the coal may be broken down by pneumatic picks. A short portable stable conveyor is available to eliminate throwing the coal to the face conveyor.

It has been found advantageous in some instances to make the next cut in the stable immediately after it has been loaded and leave it thus at the end of the shift.

Stable Timbering—The stables are supported by headers in conjunction with steep straps and props. The latter should include some device for quick release and for facilitating tight setting. Various combinations of strap lengths may be used with the headers, reflecting to some degree the thickness of the cut taken by the machine. Four headers usually are set parallel to the face line between the end of the pack and the face of the stable. Four and sometimes five props are set under each.

With this arrangement, the cut-

Double-unit plan offers advantages at Thoresby Colliery

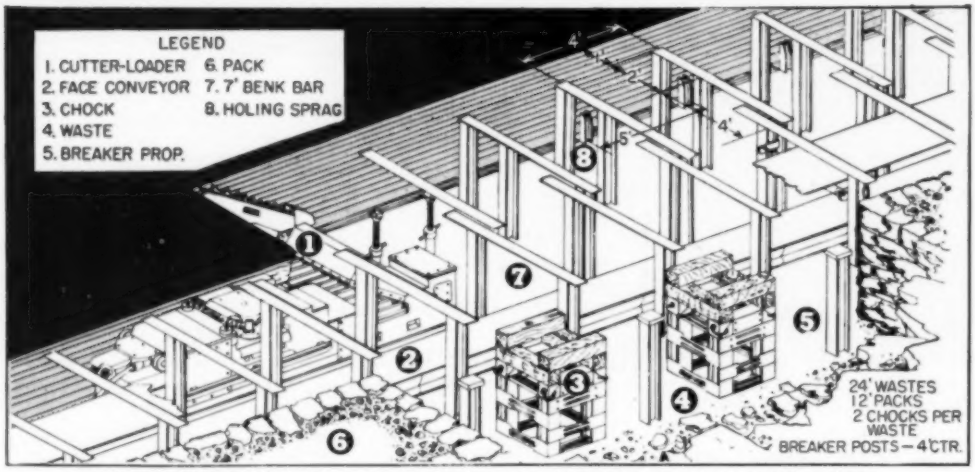


FIG. 5—**ROOF SUPPORT** on a cutter-loader face with rigid props, screw jacks and steel straps.

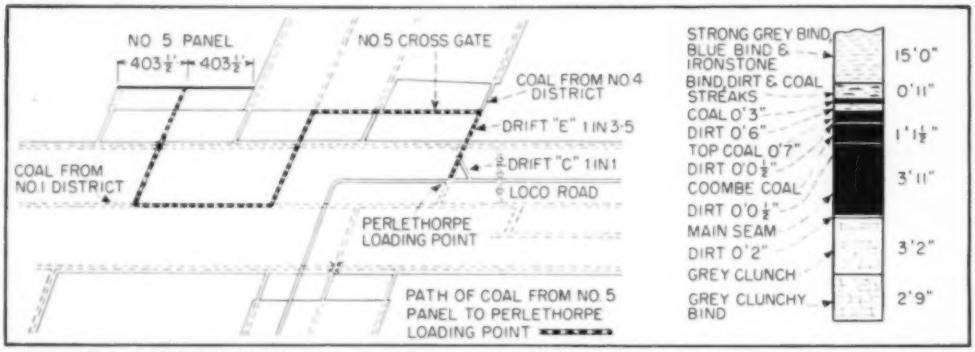


FIG. 6—**TYPICAL PLAN** and seam section for double-unit cutter-loader panel at Thoresby colliery.

ter-loader may be safely turned without taking out more than two props at once under any header. Length of the headers varies slightly, as stable lengths normally are between 13 and 15 ft. Usually, the length is 13 ft. Spacing of the headers is governed by the thickness of the cut, but it is imperative that they be set accurately in line with the face props and spaced accordingly. Fig. 4 illustrates a typical layout.

The support of the main-gate stable involves a slightly more extensive system. The tension end of the gate belt must be bridged and support provided the ripping lip. Two additional headers usually are installed in alignment with the two headers nearest the face of the stable.

Fig. 5 illustrates the timbering system adopted for Meco-Moore faces. Certain refinements have resulted from the introduction of hydraulic props, which greatly facilitate setting and removal. These props are particularly suitable for face props in the "three props to a bar" system, but their usefulness is not limited to this application. Indeed, faces have been worked with 100% hydraulic props, and mixed faces, with 70 to 80% hydraulic props are fairly common.

Turning the Machine—After entering the stable at either end of the face, the cutter-loader is turned as follows:

1. Loader conveyor run free of coal; cutting unit detached by means of hinge coupling.

2. Cutting unit turned completely around and parked in face-side corner of stable; bar pins removed and horizontal bars swung as required.

3. Cutting unit spragged; loading unit pulled forward across stable by haulage rope and rope-return pulley.

4. Cutting unit driven into cutter track with bars in cutting position ready for the next cutting cycle.

5. Loading unit pulled forward toward stable face with haulage rope and aligned with cutting unit; shearing bar previously reversed.

6. Loading unit pulled forward and coupled to the cutting unit, using the haulage rope.

Full use should be made of the detachable loader pulleys in the various hauling operations.

It must be realized that the time required to turn the machine reflects systematic conduct of the various operations. The stable should be clean and clear of all tackle, and the loader clear of loose coal. Guards and shafts should be placed in the well of the loader after removal to prevent loss and make them readily available for reassembly. Set pins

and brackets removed in reversing the shearing bar should be handled similarly. In reassembly, the set pin holes should be cleaned to permit easy screwing of the pins to the seating position.

In the turning operation, all bits are changed, trailing cables adjusted and everything made ready for the next loading shift. Care in these matters halves the labor and insures trouble-free operation.

The turning crew is a most important part of the team and has the responsibility for insuring a good start for the loading crew. Normally, two men can turn and prepare the machine well inside the shift, leaving ample time for careful examination and maintenance.

Maintenance — The cutter-loaders are maintained by the colliery staff. Experience has shown that efficient operation is assured by attention to the following:

1. Efficient, regular lubrication.
2. Daily examination for missing picks and immediate replacement.
3. Checking of the dovetail couplings at the shearing-bar end of the shearing-bar drive shaft for flushness.
4. Weekly removal of the loading-belt bugduster for cleaning and inspection.
5. Maintenance of a full complement of sharp cutting bits and correct chain tension.
6. Weekly examination of all switchgear and electrical equipment.
7. Daily check of the air-cooling system for possible obstruction.
8. Weekly removal of the inspection plugs at the base of the fan chambers and examination for oil leakage and accumulated dust. Plugs should be screwed up tightly.
9. Careful adjustment of haulage friction clutch.
10. Maintenance of the haulage rope in good condition.
11. Daily examination and periodic replacement of the loading belt. Test belt-friction clutch after replacement.

OUTPUT FOR TYPICAL DOUBLE-UNIT PANEL

Fig. 6 shows the plan and seam section for a typical face (No. 5 panel) selected at random to provide practical figures on Meco-Moore results. The coal from the face conveyors is loaded onto a main gate conveyor in turn discharging to a main belt system feeding the loading point on the diesel haul.

Output figures for the two machines in No. 5 panel for a period of eight weeks appear in Table III.

Until recently, it has been the practice at Thoresby colliery to protect the immediate roof by leaving the Coombe coal. Improved conditions, mainly as a result of the use of power loaders, have permitted recovery of the entire seam, including the Coombe coal. Thus, the Coombe coal has been taken on the left side of No. 5 panel since Jan. 29, 1951, and on the right since Feb. 2, with resultant improvement in efficiency, as noted in Table IV, covering four of the last eight weeks.

Comparative figures for power and hand loading are in Table V.

EFFECT ON COAL SIZE

Table VI shows the effect of increasing the number of power loaders on coal size. This table was developed from tests at the colliery. It shows that while the percentage of minus ½ varies in reasonable consistency with the number of machines, the variations in other percentages are less consistent and show a tendency only.

Comparing the percentages of each size in the first and last columns of Table VI shows the difference between hand loading and power loading with eight machines, as follows:

	Eight Machines	Average, One Machine
Minus ½ in.	Up 9.7%	Up 1.2%
1½x½.....	Up 8.2%	Up 1.0%
2½x1½.....	Little change	Nil
Plus 2½.....	Down 18.1%	Down 2.2%

TABLE VII shows the percentages of the total output raised and weighed of the marketed grades of the various sizes of coal at Thoresby colliery since the introduction of the Meco-Moores. This and Table VI show that some slight decrease in the larger sizes, accompanied by a corresponding increase in the minus 1½ range, may be expected following the introduction of Meco-Moore cutter-loaders.

Table III—Eight-Week Results of Cutter-Loader Operation on Typical Double-Unit Panel

1951 Week Ending	Right Side: Salable Output, Tons	Right Side: Total No. Shifts at Face	Right Side: Total No. Shifts to Loading Point	Left Side: Salable Output Tons	Left Side: Total No Shifts at Face	Left Side: Total No. Shifts to Loading Point
Jan. 20...	2,304	123	336	2,303	118	306
Jan. 27...	1,830	88	221	1,851	90	225
Feb. 3...	2,800	118	291	2,160	104	269
Feb. 10...	2,389	88	220	1,817	88	216
Feb. 17...	2,818	112	282	2,710	116	278
Feb. 24...	2,397	95	274	2,312	123	295
Mar. 3...	2,634	116	302	2,540	158	337
Mar. 10...	2,096	95	280	2,143	125	275
Total...	19,268	835	2,206	17,836	922	2,201

Number of shifts include all personnel employed either at the face or to the loading point, as the case may be, on all three shifts.

	Left Side	Right Side	Total Panel
Average output per man-shift, face, tons.....	23.04	19.34	21.11
To loading point, tons.....	8.72	8.10	8.41

Table IV—How Taking Coombe Coal Improved Cutter-Loader Performance in No. 5 Double-Unit Panel

	Left Side	Right Side	Entire Panel
Total output, tons.....	9,944	9,705	19,649
Total shifts at face.....	418	522	940
Output per man-shift at face, tons.....	23.74	18.59	20.91
Total shifts to loading point.....	1,138	1,185	2,323
Output per man-shift to loading point, tons....	8.76	8.18	8.47

Table V—Results with Hand and Power Loading

	Tons per Man-Shift	Gain per Week Over Hand Loading, Tons
Hand loading.....	6.89	...
Power loading.....	8.41	839
Power loading, Coombe coal recovered.....	8.47	868

TABLE VI—Effect of Number of Power Loaders on Size Consist of Salable Output at Thoresby Colliery

Salable Coal, Round Holes	Number Power Loaders in Use 1	2	3	4	5	6	7	8	9
Minus ½ in.	13.5	16.5	17.0	17.8	18.3	18.6	19.7	21.1	23.2
1½x½	15.9	18.9	20.5	21.5	21.4	22.4	21.2	20.5	24.1
2½x1½	14.8	14.8	14.0	13.0	12.4	13.3	12.5	13.0	15.0
Plus 2½ in.	55.8	49.8	48.5	47.7	47.9	45.7	46.6	45.4	37.7

TABLE VII—Percentage Production by Market Grades Since Cutter-Loader Introduction at Thoresby Colliery

	1944	1945	1946	1947	1948	1949	1950
No. cutter-loaders	0	1	4	8	7	7	9
Cutter-loader output	0	87,912	350,687	635,490	713,078	751,649	735,348
Total output raised	1,017,471	947,276	903,665	883,897	911,827	918,716	957,265
Size Range (%):							
Plus 8 in.	8.81	18.29	13.72	15.54	14.31	13.35	12.05
8x4	13.73	14.01	13.75	12.86	12.77	12.84	12.07
4x2½	9.19	8.90	8.47	7.98	7.70	9.26	8.98
2½x1½	10.74	11.14	10.65	10.19	10.85	13.28	12.11
1½x½	21.26	21.50	21.19	22.03	25.16	23.39	23.28
Minus ½	20.30	19.64	20.70	21.42	20.02	20.81	22.35
Others	0.53	0.66	4.02	1.54	0.80	0.49	2.29
Dirt	5.44	5.96	7.50	8.44	8.39	6.58	6.87

PSYCHOLOGICAL EFFECTS

Streamlining of production methods in all branches of industry has brought its own peculiar psychological problems. Although mechanization has provided the worker many physical and material benefits, resultant specialization has caused the work to become stereotyped and monotonous, besides decreasing the individual's opportunities for exercising initiative and adaptability. These factors alone have generally reduced the satisfaction the worker derives from his job.

The problem is probably less acute in coal mining, where day-to-day changes in conditions provide more scope for the application of individual skill than in modern mass-production factories where variations in the daily routine are avoided.

When hand-worked longwall faces were subdivided into short working places, it was possible to allocate each man definite responsibility for part of the face. On the other hand, 40 men working on a 600-ft unit do not feel themselves individually accountable for its good maintenance.

The tendency, resulting from deployment of the labor force into large teams, accentuated by the monotony introduced by specialization, is toward individual loss of pride in work and a consequent deterioration in workmanship standards. This condition may be said to exist in mass-production factories and on hand-loaded longwall conveyor faces. The problem is more easily overcome in the mine than in the factory by the evolution of a new type of craftsmanship following the development of machinery providing for the division of the labor force into small teams, in which each member has his own responsibility.

In promoting a solution to this problem, the Meco-Moore contributes greatly to its own success. The goal of mechanization is more closely attained, and each member of the small team is a specialist who can, however, do the work of any other member. As in any other forms of closely-coordinated teamwork, efficient performance of each separate operation is essential to over-all results. Recognition of the interdependent nature of their duties, in conjunction with the closeness of the men to each other, breeds in the team members a sense of responsibility for the completion of the task as a whole. Personal pride in craftsmanship of the old days is now replaced by individual loyalty to the team.

Practical evidence of the value of this somewhat nebulous quality of the machine is found in a comparison between coal-face absenteeism figures for Thoresby and the East Midlands Div. during the period of Meco-Moore installation and operation at Thoresby. In 1946, as an example, face absenteeism at Thoresby, with four machines in service, was 22.60%, compared to 23.24%, for the division; 1950, nine machines in operation, 12.79% at Thoresby and 15.95% in the division.

THORESBY GOALS

The goal of the reconstruction program at Thoresby was to arrest and reverse the downward trend in total output and output per man-shift. This has been done. Specifically, since this article was written, over-all output per man-shift has improved to 57 cwt, compared to 38.73 in 1950.

The reconstruction of the colliery is not yet complete. Mechanization, starting at the face with the introduction of power loaders and extended to the haulage system with belts, diesel locomotives and the increase in capacity provided by the new skip-hoisting system, is still to be applied to the coal-preparation plant on the surface.

Development of the Meco-Moore cutter-loader into the most reliable power loader in common use in England is concrete tribute to the determination and ingenuity of the manufacturers, and to the grit and skill of the engineers and operators of those collieries where the machine has been nursed through its teething troubles. The Meco-Moore now plays a tremendous part in the postwar economic recovery of Great Britain.

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"Roof Support at the Coal Face —Its Effect on Production," T. Wright, Midland Branch, National Association of Colliery Managers, October, 1948.



Oiler on Headsheave Halves Rope Cost

ROPE LIFE has been more than doubled by adding a drip oiler to the head sheave of a dragline of the Newport Coal Co., stripping near Robertsville, Ohio. Previously, the 1-in hoist rope handling a 3-yd 5-tooth rock bucket lasted only 1½ to 2 mo in hard digging. Now it lasts 3 to 3½ mo in the same tough service.

Earl Martin, shovel operator shown checking the oil level (left), designed the oiler. The tank was welded to the sheave guard, which forms a bottom for it. A 1-in pipe sleeve was welded around a hole placed in the center of the tank top and a small hole was then drilled directly below it through the bottom of the tank. A pointed rod welded to a 1-in pipe plug acts as a needle valve to regulate the drip rate of oil onto the hoist rope, with the plug also serving as a cap for the tank. Atlantic 250 gear oil is used.

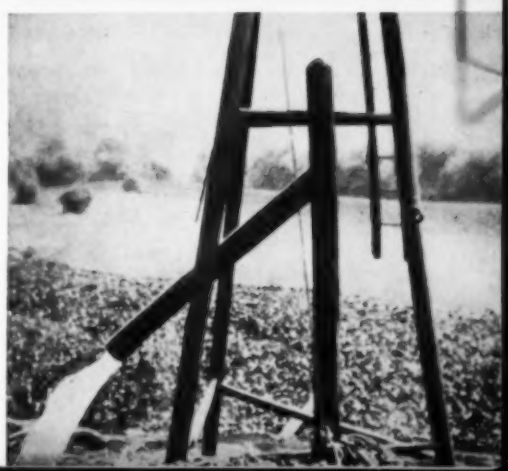
The Lima 1201 dragline is powered by a Buda 190-hp diesel engine and employs a Page rock bucket. Equipment also includes a 3-yd Hendrix bucket for softer digging.

Plastic Pipe Makes Better Borehole Lining

THE PROBLEM of lining a borehole to permit corrosive water to be pumped from a colliery of the Lehigh Valley Coal Co., Wilkes-Barre, Pa., was solved by placing an 8-in plastic pipe in the 180-ft-deep hole. As a result, a mine pump now discharges 800 gpm at 80 psi through the Carlon-lined borehole, and longer life for the lining is expected because Carlon does not rot, rust or corrode. Furthermore, the smooth interior walls of the pipe inhibit scale accumulations, thus minimizing friction losses.

In placing the plastic pipe, 21-ft sections were connected by cemented slip-sleeve fittings as the line was lowered into the hole (top). The entire lining was placed in about 5 hr, an indication of the ease of handling. The plastic pipe weighs only one-eighth as much as steel of the same capacity. The all-plastic discharge spout (bottom) was designed to deflect the stream away from the hole.





Additional work-proved "Operating Ideas" begin on p 126.



PORTABLE TIPPLE ONE OF TWO rubber-tired crushing plants is loaded by a 1½-yd shovel in Pit No. 1. It has a hammer-type crusher, vibrator, and a divided loading chute to avoid truck delays.

Mobile Preparation Plants Serve

Developing coal missed by earlier prospectors, Marshall Mining installs new 14-yd dragline to maintain lead as largest stripper in Northeastern Ohio. Portable tipples and aluminum pipe prove value.

CRUSHING AND TRUCK-LOADING PLANTS ON RUBBER TIRES operating in the pits at the loading shovels, a new dragline, said to be the largest electric walking unit in coal in eastern Ohio, and the use of aluminum drainage pipe with easily connected push-pull couplings, are among the outstanding operating features of the three strippings of the Marshall Mining Co., Youngstown, Ohio. Mining is being carried on in a section where strip prospecting in the World War II expansion period missed large areas of coal near enough to the surface for stripping.

The company, owned by Robert B. Marshall, president, and L. E. Brauninger, secretary-treasurer, both of Youngstown, was organized in 1937 and opened its first strip pits in Columbiana County near Lisbon, Ohio. In January, 1947, it moved to the present location, the North Lima field, Mahoning County, about 12 mi south of Youngstown. Recently, the company has been producing around 25,000 tons per month, and in this field has mining rights on 35 farms, totaling 4,000,000 tons, principally in Springfield Township.

The 30-in-thick seam, known locally as the No. 4, is free of partings and the mined product carries about 7% ash and runs around 12,700 Btu unless cannel coal is encountered. In some spots the cannel constitutes a considerable portion of the seam.

COVER AVERAGES 50 FT

For the most part the coal lies below drainage, with crop lines buried to about 25 ft. On most knolls the cover runs to 75 ft or more, so that the depth removed averages approximately 50 ft. In the deeper excavations, 25 ft or so of hard shale is encountered, but its character does not make it difficult to shoot. One McCarthy horizontal drill handles all drilling for three pits and shooting is done with Atlas powder.

Since the seam is thin and the roof bad, little underground mining has been done in the field and it is seldom that old workings are encountered. The active mining period, from 1870 to 1890, centered in localities nearer to Youngstown.

ALL OUTPUT TRUCKED TO USERS

All the Marshall Mining Co.'s present output is shipped by truck to steel mills, electric power generating stations and other manufacturing plants in the Mahoning and Shenango valleys. The average haul to the Youngstown plants is 12 mi, with a 16-mi haul to a power plant at New Castle, Pa. The product is sold at a delivered price and the coal company contracts the hauling. Several customers require crushed coal.



BIGGER DRAGLINE **SHOWN OPENING** a new pit, new 14-yd electric walking-type dragline can handle cover up to 80 ft.

Modern Strippings

While a few 15-ton semi-trailers are used, hauling is mostly in 10-ton trucks. The coal company sidesteps all haulage problems by not having a permanent tipple, loading the highway trucks in the pits instead. Two of the three operating pits are equipped with Universal portable crushing and truck-loading plants made by the Universal Engineering Corp., division of Pettibone Mulliken Corp., Cedar Rapids, Iowa.

COAL CRUSHED IN PIT

One plant, photographed in Pit No. 1 (Pfau farm), is equipped with a hammer-type crusher with a vibrating screen to by-pass the fines. A Caterpillar D-13000 diesel engine drives the crusher and vibrator, and a 30-hp Le Roi gasoline engine powers the loading conveyor.

The other portable plant, photographed in Pit No. 2 (Padurean), has a jaw crusher, which is more suitable to the tougher job of breaking cannel coal. In this plant a bar screen does the by-passing and both crusher and loading conveyor are driven by one Murphy diesel engine. The plants are moved by bulldozers. In Pit No. 3 (Ginger Hill), the loading shovel deposits coal directly into the highway truck and this product can go only to customers which do not require precrushed coal.

In addition to the portable crushing plants, the company uses the following main equipment:

One Marion 7400 walking dragline (new March, 1951) with 160-ft boom and 14-yd Esco bucket, powered by a 750-hp 4,000-v motor. Total weight is 600 tons, and the unit is designed to move 80 ft of overburden. It utilizes Amplidyne control and all power and control equipment are General Electric.

One Lima 2400 crawler-type dragline, with 120-ft boom and 7-yd bucket, driven by a Caterpillar 500-hp diesel.

One P&H 1055 crawler-type dragline with 80-ft boom and 4-yd P&H bucket, driven by a Buda diesel.

Two Lima 1201 crawler-type draglines, with 80-ft booms and 3½-yd Hendrix buckets. Both machines are operated by Cummins diesels.

Four shovels used primarily for loading and occasionally for stripping and miscellaneous duty. Three are Lorain units, consisting of a Model 79 with 1½-yd bucket; Model 77 with the same size bucket; and a Model 75 with 1¼-yd bucket. The fourth shovel is a Lima 1-yd "Paymaster."

Two Allis-Chalmers HD19 bulldozers with GM diesels.

Three Caterpillar D8 bulldozers.

Two Caterpillar D4 bulldozers.

One Ferguson broom with Ford tractor power.

Twelve Gorman-Rupp portable 4-in self-priming centrifugal pumps driven by Hercules 30-hp gasoline engines.

One Gorman-Rupp 10-in centrifugal pump driven by a Hercules 87-hp gasoline engine.





ALUMINUM PIPE **FOR PIT DRAINAGE,** 4-in aluminum pipe with easily connected couplings feeds 12 pumps (right).

Equipment and methods geared to conditions at Marshall Mining pits . . .

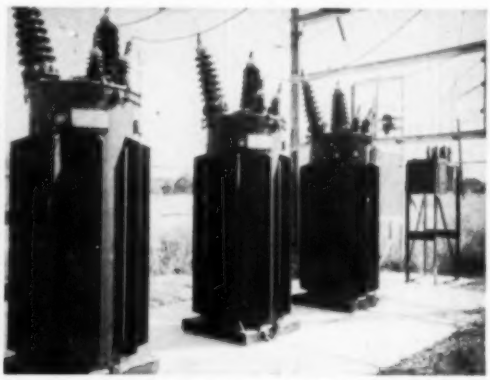


RUBBER-TIRED PLANT in Pit No. 2 has a jaw-type crusher, which is particularly effective in handling cannel coal. Plant is moved by bulldozer as necessary.



POWER BROOM has finished sweeping coal in Pit No. 1 prior to loading.





ELECTRICAL EQUIPMENT for new dragline includes cable-skid switch house connecting two 1,000-ft lengths of ground cable (left) and company-owned 750-kva substation supplying 4,160 v. Grounding resistor and circuit breaker are at right.

One McCarthy horizontal drill.

One repair shop with portable welders, air compressors, etc.

Stripping is done six days per week, three shifts per day; loading seven days per week, one shift per day. The coal is loaded without shooting. In dry weather haulage is mostly on the bottom. During the wet season, however, it is principally on the coal, and a berm of the seam is left in place along the highwall for that use.

STRIPPING METHODS VARY

Ordinarily a dragline operating without benching can dig to a depth one-half the length of its boom. Thus the new electric machine can handle up to 80 ft of cover, while the Lima 2400 unit is limited to 60 ft and the smaller draglines to 40 ft.

In the benching method used with the smaller units, bulldozers push the top material into the pit. The dragline operating on the bench needs to rehandle only a small percentage of the bulldozed material because it is largely clay and is packed so well by the bulldozer that the spoil bank will hold at a steep angle.

Coal-company-owned equipment for supplying electric power to the new dragline includes a transformer substation consisting of three 250-kva Spirakore transformers reducing from 67,000 to 4,160 v, a neutral grounding resistor, and an oil circuit breaker to trip out with ground-fault current, all made by the General Electric Co.

A pole line 1 mi long carrying No. 1/0 copper conductors and a grounding wire serves the ground-cable system. Present portable equipment consists of two 1,000-ft lengths of Hazacord Type SH-D shovel cable, No. 1, three-conductor, with Hazaprene ZBF neoprene-compounded sheath; and two General Electric cable-skid switch houses equipped with overload and grounding current relays. One switch house is kept at the base of the pole where the ground cable is tapped, and the other is at the junction of the two lengths of cable. The coupler sockets and plugs connecting the cables to the houses also are General Electric.

ALUMINUM PIPE IN PITS

Since they are below drainage, all pits must be pumped. Ten-inch spiral pipe is used for the large pumping unit. With the 4-in units, it was the practice until recently to use fire hose as discharge lines. Now, the hose is being replaced with 4-in thin-wall aluminum pipe in 20-ft sections, purchased from the Oldfield Equipment Co., Cincinnati, and equipped with McDowell push-pull-type couplings. These bell-and-spigot-shaped joints have spring-loaded rubber gaskets that permit several degrees of deflection. The special



OWNERS: L. E. Brauninger (left), secretary-treasurer, Robert B. Marshall, president.



IN BENCHING for smaller units, bulldozers push top layer into pit. In the background, the 3½ yd dragline is working on the bench.



ON THE JOB: R. S. Dillon (left), superintendent, and Ed. Moore, electrician.



LEVELING OF LAND, stripped to the farm house, has just been completed (light portion), with vegetation begun on darker part leveled a year ago.

rubber gaskets on the couplings automatically seal the joints when under pressure. When the pump stops, the joints leak sufficiently to prevent damage from freezing, and the couplings also carry drain plugs which can be used to drain the line completely. The pipe is coupled and uncoupled without tools and requires only slight effort by the man laying or dismantling the line. Experience has demonstrated that men driving trucks, automobiles and other mobile equipment respect the aluminum pipe and do not run over it.

The company spends a great deal of money on prospecting, which is done with both churn and core drills and is contracted to commercial drillers. Early prospecting in the district overlooked much of the coal because holes were drilled in low ground and thus missed the buried crop of the seam. The later deeper drillings on higher ground on the slopes hit the coal.

RECLAMATION MAJOR FACTOR

Mr. Marshall was a charter member of the Ohio Reclamation Committee, which led to the organization of the Ohio Reclamation Association, of which he is past president. Membership in this association consists of more than 100 strip-mine operators, for whom it does planning, planting and experimental work on strip lands.

The Marshall Mining Co. already has carried out considerable leveling since passage of the Ohio strip-mine law in January, 1948. All reclamation work is done for the benefit of the land owner and the company plans to do a better job than the law requires. For the most part, levelings to date have been adjacent to farmhouses and public roads, on lands stripped since the law was passed, together with considerable acreage stripped prior to passage of the law.

Acquisition of the 14-yd electric dragline has raised the company's capacity to 41,000 tons per month, but its planned production is 30,000 to 35,000 tons. The new dragline alone can produce an average of 17,000 tons per month. The 7-yd Lima can produce 10,000 and the smaller draglines about 4,500 tons each. It is possible that the company will decide to sell some of the smaller equipment.

The new setup puts The Marshall Mining Co. still farther in the lead as the largest stripper in this northeastern section of the state. In addition to its large reserves in the North Lima field, it has available 1,250,000 tons across the line in Pennsylvania in the Edinburgh district and 1,000,000 tons in various locations in Coshocton, Jefferson and Columbiana counties, Ohio. In the 15 yr of its existence it has drilled 700 farms.

Richard F. Marshall, son of Robert B., is vice president of the company, and R. S. Dillon is superintendent.

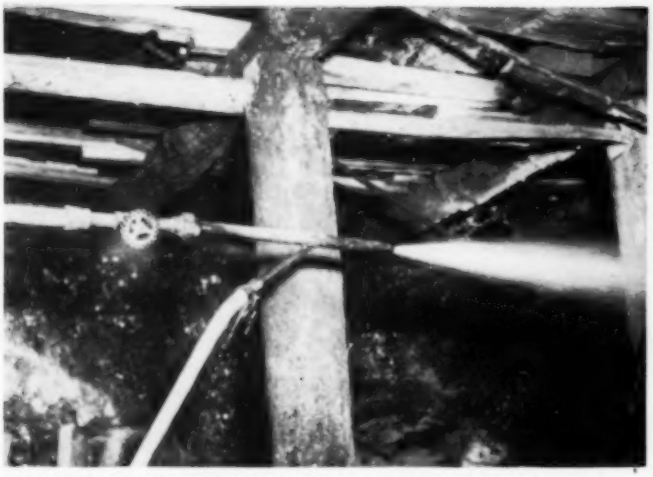


FIG. 1—**FOG GUN IN ACTION** back of a face. Introduced in 1930, the fog gun has materially improved conditions during and after shooting.

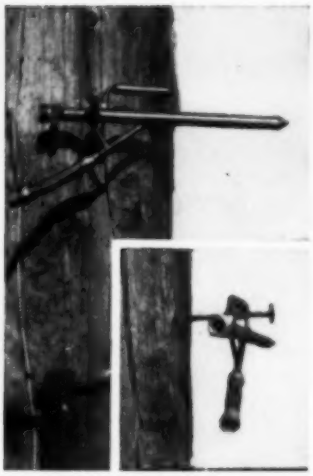


FIG. 2.—**SPIKE** back of handle on gun permits easy mounting on post.

How Fog Guns and Multiple Shooting Promote . . .

Dust and Fume Control

Millisecond delay detonators reinforce multiple shooting and use of fog guns at the face to attain new lows in dust and fume production at Washington coal mines, extensive studies show.

By L. H. McGUIRE
Chief, Accident Prevention and Health Div.
Region II, U. S. Bureau of Mines, Seattle, Wash.

SEVERAL YEARS' experience in coal mines in the State of Washington has definitely proved the advantages of the fog gun and multiple shooting in reducing dust and fumes in blasting coal. These advantages have been enhanced in the past 3 yr by the introduction of millisecond-delay detonators, now used in mining 75% of the state's total output.

The fog gun (*Coal Age*, November, 1947) was developed by W. J. Evans, chief mine inspector for Washington, in 1930 in a successful attempt to improve conditions at the face during and immediately after blasting. Instantaneous multiple shooting was first employed at Carbonado mine in Washington in 1924 by Simon Ash, now chief of the Safety Branch, Health and Safety Div., U. S. Bureau of Mines. Multiple blasting with millisecond delays was first used at Bellingham No. 1 mine in 1948 to solve a difficult and somewhat unusual blasting problem.

Washington coal seams present a variety of conditions from the mining and safety standpoints. Both flat and pitching beds are worked, and thickness of the beds mined ranges from about 3 to 40

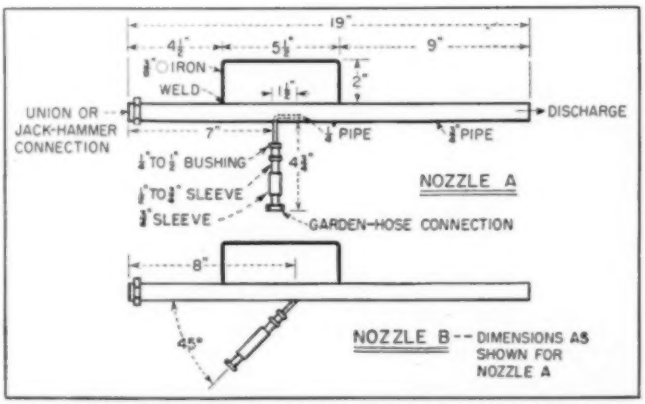


FIG. 3.—**FOG-GUN DESIGNS** include 90- and 45-deg water inlets.

ft. For the most part, the roof is tender and friable, necessitating close timbering and lagging. The ducts generally are in the more explosive range, and dryness is a condition under which a majority of the state's tonnage is mined. In many instances, shooting off the solid is a common practice and is the only method possible where the pitch is steep. These conditions and other factors emphasize the need for extra precautions in blasting and in other mining activities.

FOG GUNS

Versions of the fog gun commonly used in Washington are shown in accompanying illustrations. The gun usually is a piece of ¾-in pipe about 19 in long, flattened at the discharge end to produce a nozzle with a fan-like spray for use in thin coal beds. The bell-mouth-shaped nozzle is used in thick beds. The intake end is provided with a standard air-hose fitting.

Water is introduced through a ¼-in pipe, spot-welded into the side of the fog gun at either 90 or 45 deg—more commonly the latter. Occasionally, the ¼-in pipe is extended into and along the fog-gun pipe for a distance of about 2 in, thus providing a useful injector effect when water pressure is low. The water pipe is provided with a garden-hose fitting. A handle and spike fastened on the side of the fog gun opposite the water-pipe inlet permit easy handling and fastening to posts.

The fog gun, depending on seam thickness and other conditions, usually is installed 2½ to 7 ft above the bottom and 15 to 30 ft from the face, and is pointed toward the center of the cut or section being shot. The air and water are turned on immediately before blasting and left in operation 1 to 3 min after each shot, or round of shots. A major advantage is that there are no screens to clog and the unit is always in operating condition.

The fog, as indicated in the summaries of dust counts and fume analyses in the accompanying tables, is most effective in suppressing both these by-products of blasting.

MULTIPLE BLASTING

Prior to the adoption of multiple blasting, first with instantaneous detonators and recently with millisecond-delay detonators, the usual practice in Washington mines was to load and fire each hole separately, or to load a group of holes and then fire them one by one. State regulations permitted the latter practice—as long as there were no dependent shots—to reduce the hazards involved in going back to inspect, test for gas, and charge and connect each shot individually. Hazards to the shotfirer or miner from falling coal or rock at the face in steeply pitching places after the first shot was fired were obvious when several shots were fired singly.

Disadvantages of firing each hole individually and without the fog gun were:

1. Concentrations of dust and fumes were heavy. They reduced visibility and made gas testing, roof examination, loading of holes, and connecting more difficult.

2. When all holes were drilled before firing and each was charged and fired individually, the shotfirers or miners were repeatedly subjected to the hazards of overhanging brows and unprotected roof when visibility was reduced. In addition, firing of some holes sometimes would crush the others.

3. If the holes were drilled, charged and fired separately, the exposure to the hazards listed in Item 2 would be lengthened materially, since, for example, time studies showed that the average elapsed time for drilling and cleaning a 5½-ft hole was 5 min.

4. Time lost in firing each hole individually was substantial, running from 25 to 75 min per shift when compared with multiple shooting.

5. The delay in extending lagging or forepoling after blasting sometimes resulted in additional roof trouble.

DUST REDUCTION

The result of dust counts derived from various mine tests with and without the use of the fog gun and with single shots, groups fired instantaneously, and groups fired with millisecond delays are summarized in Table I. The maximum number of shots fired in a group was the number that could be fired with a permissible multiple shotfiring unit. Usually, however, groups ranged from 3 to 9 shots, but at times as many as 19 shots were fired in multiple with millisecond-delay detonators.

All blasting was observed under normal operating conditions. A midget impinger was used for collecting the dust samples, and particle numbers per cubic foot were determined with the U. S. Bureau of Mines midget microprojector. Accessory instruments were the

TABLE I—Summary of Dust Counts Obtained Under Various Blasting and Spraying Situations, Washington Coal Mines, 1947-1950

	Without Fog Guns		With Fog Guns	
	Range*	Avg.	Range†	Avg.
Single shots	24.3–280	118.8	6.6–33.6	16.8
Instantaneous multiple blasting	86	86	5.0–64.0	26.6
Millisecond-delay multiple blasting	96.2	96.2	3.3–56.0	17.0‡

* High dust counts indicated for single shots resulted after 3 or 4 shots of a series were fired in place without use of fog gun.

† High dust counts from three samples resulted from improper direction and use of the fog gun.

‡ This average obtained from eight samples in two mines under dry and dusty conditions.

TABLE II—Results of Fume Survey Following Blasting in a Washington Coal Mine, December, 1950

	Place				
	A	A	A	B	C
Carbon dioxide	0.5	0.08	0.09	0.05	0.07
Oxygen	20.88	20.86	20.78	20.88	20.91
Hydrogen	.....	.....	.....	.....	.....
Carbon monoxide	−0.0025	−0.01	0.01	−0.01	−0.0025
Methane	0.13	0.21	0.26	0.13	0.11
Nitrogen	78.94	78.84	78.86	78.93	78.91
Oxides of nitrogen, PPM	11	35	36	.....	25

Samples taken in Place A after 3, 1, and 6 shots; Place B after 6 shots; and Place C, after 17 shots in three groups.

Results are in percent by volume, except where otherwise indicated, with PPM indicating parts per million.

anemometer and psychrometer. Air-borne dust samples were collected as soon as the shotfirer returned to the face to make an examination for gas. One sample was collected immediately prior to blasting.

The summary in Table I is a composite of a number of counts made under a variety of conditions, both as to types of working places and face-preparation practices. It shows that a substantial reduction in dust counts occurred in each method of blasting when the fog gun was used. In almost every instance where the fog gun was properly used and blasting was properly done, the dust counts were well under the accepted standard of 50 million particles per cubic foot of air for coal containing not more than 5% quartz, which, from a health standpoint, is the accepted maximum concentration to which men should be exposed.

Specific blasting jobs surveyed included a face where three shots using 10 sticks of permissible explosive were fired with millisecond delays in one blast. The end of the line brattice was 15 ft from the face. The place was not wetted down prior to blasting, the fog gun was not used, and air movement was slight. The dust count was 96.2 million particles per cubic foot of air immediately after blasting.

After thorough wetting down and standing with no activity in still air and with 6,900 cfm in the last crosscut 50 ft outby, the dust count in another face was 1.7 million particles per cubic foot before blasting. After firing seven holes loaded with 25 sticks of permissible explosive primed with millisecond-delay detonators, with the charges well balanced and the fog gun 25 ft from the face, the count was 6.2 million particles per cubic foot. The fog covered face, roof, ribs and floor.

Three shots were fired in multiple with millisecond delays in the top bench in still another face. The place was not wetted down before blasting. The fog gun was 17½ ft from the face and was turned off 1 min after firing. Air movement was 5,800 cfm, and the dust count was 7.8 million particles per cubic foot. Later, in the same place, a single bench shot was fired with the fog gun turned off. The place had been wetted down previously, and the dust count was 24.3 million particles per cubic foot of air after firing.

FUME REDUCTION

Table II summarizes the results of a fume survey following blasting at one mine. Air samples were collected as soon as the shotfirer returned to the face to make an examination for gas. The two most significant gases, from the health aspect, are carbon monoxide and oxides of nitrogen. For comparison, two blasts with permissible explosives were fired in Place A: one shot without the fog gun and three shots fired in multiple with millisecond delays with the fog gun. The quantity of air, 5,800 cfm, was the same for both tests. As shown in Table II, firing of the multiple shot resulted in lower concentrations of both carbon monoxide and oxides of nitrogen than the single shot. Although the carbon monoxide was slightly less, the concentration of oxides of nitrogen (11 parts per million) was only one-third that resulting from firing the single shot without the fog gun in operation.

The results of the other tests summarized in Table II indicate little difference, in so far as the concentrations of toxic gases were concerned, between the firing of six shots in one series or 17 shots in three series, driving headings or rooms, blasting off the solid, or blasting undercut coal. In all instances, with the exception of the single shot, the fog gun was used effectively during blasting operations. Probably the greatest factor in obtaining uniformly good results was that the shotfirer permitted the fog gun to operate from 1 to 3 min after the shots were fired.

The results indicate that if the air is properly coursed to the face and the fog guns are directed effectively, the initial concentrations of carbon monoxide and oxides of nitrogen immediately following blasting are held within reasonably low limits.

DUST IN OTHER OPERATIONS

Results of dust counts for other operations at two Washington mines are summarized in the following (tests made in January, 1948):

Miners' Weighted Average Daily Dust Exposure

	Mine A		Mine B	
	Percent of Dust			
	Time	Count	Time	Count
Drilling	11%	46.0	9%	68.0
Shooting	8	146.0	10	27.0
Loading	61	24.0	67	31.0
Timbering	11	3.6	7	4.5
Travel	9	11.0	7	7.0

Mine A—Total count, 33; free silica count, 0.3; driving rooms and headings; coal generally dry; single-shot and multiple blasting employed; fog guns used in only one-third of the blasting operations. Free silica was 1%.

Mine B—Total count, 31; free silica count, 0.3; driving rooms; coal dry to damp. Free silica was less than 1%.

Additional tests at Mine B in December, 1950, showed dust counts in cutting, drilling and loading ranging from 25.7 to 85 million particles per cubic foot of air in drilling, 48.5 for sumping and cutting (one sample), and 4.3 to 18.3 for loading—the latter including simultaneous drilling.

The average dust count from samples collected in two rooms and one heading was 37.3, or almost four times that following blasting (9.5) which, as previously noted, was done with fog guns and millisecond delays, with one exception. Dry drilling accounted for the highest concentrations. The next was cutting, even though water was used on the cutting bar. The lowest was loading out and cleaning up a place that had been thoroughly wetted down.

CONCLUSIONS

Multiple blasting with either instantaneous or millisecond-delay detonators is considered a safe and efficient practice, provided compressed-air-and-water fog guns are always used during the blasting operation. The value of the fog guns or sprays in promoting safe, healthful, and comfortable working conditions in dry and naturally dusty mines cannot be overemphasized.

Dust and fume surveys in Washington mines indicate that where fog guns are used effectively dust and fume concentrations in the mine atmosphere are kept well within permissible limits. However, fog guns are not a substitute for adequate ventilation at the working faces. Without good ventilation—a necessity in gaseous mines—the air-borne dust and fume concentrations would have been much greater. Keeping the fog guns running 1 to 3 min after shooting is a material help in reducing air-borne concentrations.

Multiple blasting also provides a satisfactory coal product from the standpoint of loadability. Product size is as good or better than that obtained with the blasting methods formerly employed.

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Foremen's Forum

What It Takes To Be a Leader

Through all industries runs a strong thread of consistency as to what constitutes good management and supervision. Consider the views of two observers of America's great efforts, mining and manufacturing.



MINING SPOKESMAN, C. J. Flippen, labor commissioner, Kanawha Coal Operators' Association, Charleston, W. Va., stated his case at a Williamson, W. Va., meeting of the Pond Creek-Tug River Mining Institute.

MANUFACTURING LEADER, William B. Given, Jr., chairman of the board, American Brake Shoe Co., New York, gave his observations at a meeting of the National Industrial Conference Board.



Fabian Bachrach

Under major headings, as follows, the excerpted remarks of Messrs. Given and Flippen spotlight the parallel nature of good supervision and management in vastly different businesses.

THE FOCAL POINT

MR. FLIPPEN: In this discussion I shall try to analyze some of the problems confronting mine management and affecting the so-called minor supervisors, although to my thinking a mine foreman who spends thousands of dollars each month in labor and materials is not so minor.

MR. GIVEN: For every executive position we try to have one or two potential successors on hand. What I have to say will come out of the thinking and planning we apply to these positions and the atmosphere we are trying to create. If we are to succeed in the development and stimulation of executives, the whole range must be covered. Any plan must have all ranks in mind and also actually reach into junior ranks. Many firms have found it difficult, in the period after the training course to hold apprentice graduates. The stimulation of their ranks is an essential objective.

TRAINING BOSSES AND EXECUTIVES

MR. FLIPPEN: Training of supervisors by someone is absolutely essential for a smooth-running production machine. The kind of training supervisors get determines in most cases what sort of company we have, and this means a team or a mob, depending upon the care that is exercised in nurturing and building morale, knowledge of one's duties and the ability to make instant and correct decisions when necessary and have these decisions stick after being made.

MR. GIVEN: Upon becoming company president in 1929, it was obvious to me that my most important, and probably most critical, responsibility was development of management people.

UP-GRADING WITHIN THE COMPANY

MR. GIVEN: It is our policy to give our own people the benefit of advancement as openings occur. We believe that unless we have no one who could possibly qualify, it is not fair to the company people to hire an outsider merely because he successfully held a high place in another company. To do so takes the exciting element out of a man's work life and often cancels the effect of money advancement.

MR. FLIPPEN: We must not forget the financial cost of hiring and breaking-in new supervisors, which is probably more than for hiring other employees. For this and sometimes other reasons, many companies prefer to train men for promotion rather than to hire new men for these jobs.

MAKING NECESSARY CHANGES

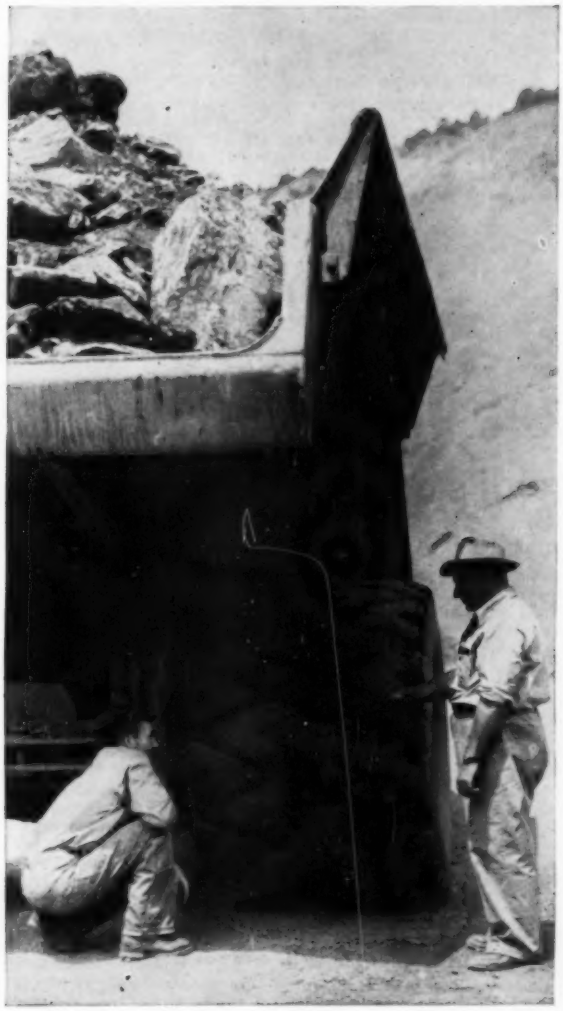
MR. GIVEN: In my opinion, the removal from executive places of each and every one who is not the kind of man you would enjoy working under, is essential. If you don't move them, it can't be offset by inflated salaries or glorious stock plans for the others.

MR. FLIPPEN: Leaders are not born, but are made,

COAL STRIPPER REPORTS

B.F.Goodrich

Universal tires reduce road delays, give more traction, more recaps



Louis Serado, General Foreman of Fauzio Bros., and driver Philip Rapant examine B.F.Goodrich Universal tires that have seen 3,450 hours of use. The company expects these tires will be good for over 4,500 hours.

FAUZIO BROS. of Nesquehonig, Pa., strips coal in the Pennsylvania anthracite region. This company operates over 100 trucks in off-the-road service—up and down steep grades, through deep mud, over roads strewn with rocks and coal, and over no roads at all. And these trucks carry an average load of 35 tons!

Such rugged trucking conditions call for equally rugged tires. That's why Fauzio Bros. uses B. F. Goodrich tires — has used them since 1935. And the report: BFG Universal tires give excellent service. The extra-thick tread wears longer, assures full traction. The nylon shock shield reduces the number of road delays, increases the number of recappable tires.

Yes, the nylon shock shield, exclusive B. F. Goodrich feature in all truck tires of 8 or more plies, saves time and money for mine operators.

Strong, elastic nylon cords are embedded in rubber under the tire tread. These cords stretch together under impact to shield the cord body from smashing road shock. Mine operators get longer, better service from BFG tires because the nylon shock shield (1) increases tire life (2) boosts the number of recappable tires — for more miles per recap (3) gives greater bruise resistance (4) reduces the danger of tread separation.

There are BFG tires designed for *all* types of mining work. Find out from your dealer which tires meet your particular needs, or write direct to *The B. F. Goodrich Company, Akron, Ohio.*

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

What top management looks for in its prospective leaders . . .

providing they have a capacity and willingness to learn. Those who lack this capacity and willingness must be put into other work. You may say this is the law of the jungle but I say it is one of the laws of modern successful business.

FOSTERING LOYAL TEAMWORK

MR. GIVEN: Frequently, senior officials think of loyalties only in terms of those to a company or a boss. The essential loyalty is the one that flows down the management line—the loyalty of the boss to the man under him. General Ridgway recently said, "Loyalty that comes from the top down is just as vital as the loyalty that comes from the bottom up." I think it more vital!

MR. FLIPPEN: "Everybody's business is nobody's business" is where leadership should start to function, and the main responsibility still is at the top of the company organization and flows toward the bottom. No high official can escape this absolute law which makes him responsible for a smooth-running machine or an inefficient or haphazard one. On the other hand, it is the duty of supervisors to cooperate in working out company policies as orders are handed down from above, and these men cannot escape the responsibility of carrying out policies and mine laws and conforming to the labor contract.

SUPERVISORY FREEDOM

MR. FLIPPEN: Too much bossing can be done under present methods, I think. Therefore, men should be taught to rely upon themselves. Leadership is what is needed instead of the old method of looking down one's neck with the threat of discharge always imminent. A feeling of security should be fostered.

MR. GIVEN: A great stimulant to competent people is contained in a feeling of personal freedom, freedom to think and plan boldly, freedom to venture along new and untried paths, freedom to fight back if their ideas or plans are attacked by superiors and freedom to take calculated risks. These adventures make men restless to get back home to tell the story. In the telling, there is not only personal pride but also pride of company.

MR. FLIPPEN'S CONCLUSION

We are creatures of habit. Therefore, the cultivation of good management habits can assure us of some dependability in labor relations and will be a source of satisfaction in looking forward to the time when we may expect better relations with those with whom we work. Good labor relations are a valuable asset, and can make or break any organization, so isn't it worthwhile to cultivate them?

One thing to remember is that we cannot buy good labor relations nor pick them from bushes, but we must earn them by hard work and study, planning, thinking, respecting fellow workers, cooperating and by evaluating the men under us by patient study and analysis. Good labor relations do not just happen; they are earned by the proper application of principles of good management.

Also, the development of a good supervisor requires long, patient work because there are so many lessons and experiences to be learned. Technical details must be mastered, correct traits of personality formed, company policies learned, leadership and prestige developed, and teamwork demonstrated.

MR. GIVEN'S CONCLUSION

Probably the greatest stimulant of all comes from the feeling of being placed for your whole work life—that you have enlisted for whatever period of work lies ahead of you. Our task is to create such a desire in executives and potential executives. That means giving them as many as possible of the things we would want if in their places.

The peak is reached when the individual has a deep conviction that his company's moral and social influence extends beyond its corporate activities, and that by reason of this, his job offers him an opportunity to make the world a little better for other people.

While watching bricklayers one day, a "sidewalk superintendent" asked one man, "What are you doing?" He answered, "Laying brick." To the same question, another bricklayer answered, "I am building a Cathedral." There is the same difference of conception among executives in business. This difference will not exist under leadership that has the urge of usefulness.

How To Be a Successful Boss

By HARRY NORTHOVER
Washington, Pa.

NEARLY ALL OF US are bosses at one level or another, from the chairman of the board of the corporation down to the housewife who has a maid to do the cleaning once a week. What's more, those of us who aren't bosses look forward to being included in this category some day.

What is "being a good boss"? Does it mean being easy or self-effacing? Not at all! It requires, instead, a combination of calmness and fairness, tempered by an interest in the subordinate as an individual and a vital human being.

The fellow who waits for something to turn up may find that his toes do first. Someone must think beyond the clock. Someone must dream beyond the shift. Someone must be responsible for the payroll, for improving the product, for selling the service. The only way to be more valuable to an employer is to produce more, either physically or mentally. The only way we can continue to pay a premium is by increased performance.

For all of us as individuals, and for the country collectively, the only way to have more is to make more. Certainly the only way to have less is to produce less.

Even if actual physical aid is restricted to a certain limited shift, a man can think, plan, prepare and improve well beyond the regular hours of actual physical effort. The person who withholds willing work, who quits as quickly as he can and who closes his mind "after hours" places a penalty on his own personal progress and future prospects and on his country's production, prosperity and power.

Don't make changes affecting subordinates without explaining "why." You would be surprised how often employees will mistakenly assume that an unexplained reassignment indicates the boss's dissatisfaction with his work.

If you must criticize, do it privately. Calling down a subordinate in the presence of a fellow employee creates resentment. Don't spy. A sense of privacy is necessary for self esteem. The impression that the boss is breathing down his neck makes an employee tense.

Issue as few order as possible, and only those you know you can enforce.

Don't be a buck-passer. Employees respect a boss when they know he will stand up for them and not try to slough off responsibility when things go wrong.

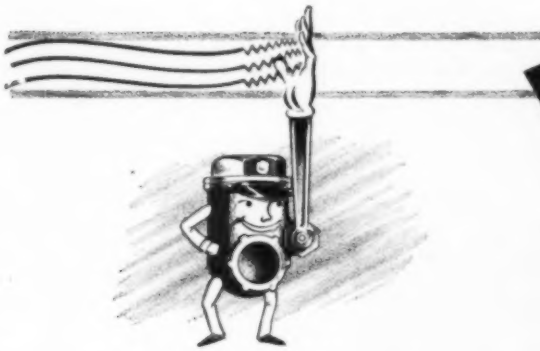
Show an interest in accepting suggestions. A one-man organization is a weak organization, no matter who the man is or how able he is. We can't make all the decisions for everyone around us, we can't watch all the details, we can't do everything ourselves, we can't follow through. We have to learn to let others do something for us; we have to trust them to do what we can't do but we can't expect them to do precisely as we would do. They will make mistakes—foremen and department managers make mistakes. So do general managers, presidents and directors. But for our own sake as well as for the sake of the work and the sake of the future we must give other people responsibilities, and trust them to see them through.

Don't argue. Engaging in a heated debate with a subordinate creates future resentments. As boss, you probably will win your point but lose in the long run.

If you practice at least half these suggestions, you know you are a successful boss.

Specify this Fast-action Gate for quick, sure STOP and GO services

JENKINS





BRONZE GATE VALVE

125 lbs. Steam
200 lbs. O.W.G.
¼" to 2"

Wherever full, free flow is essential . . . where valve opening and closing must be instantaneous . . . Jenkins SWINGTITE Fast-Action Bronze Gate Valves are setting new standards of performance and endurance.

The exclusive rolling disc and guide track design in the new Jenkins SWINGTITE distributes the wear, assuring maximum tightness (since it prevents uneven wear of seating surfaces), and lengthens valve life.

Use the SWINGTITE wherever fast-action valves take a beating on your processing lines. Compare it for long life and low maintenance. Prove for yourself that day after day it opens freely for full flow, and, closed, it seats tight and *stays* tight.

Ask your Jenkins Distributor for the folder, Form No. 196, describing the SWINGTITE in detail. Or write: Jenkins Bros., 100 Park Ave., New York 17; Jenkins Bros., Ltd., Montreal.

SOLD THROUGH LEADING INDUSTRIAL DISTRIBUTORS

SETTING NEW RECORDS FOR LONG LIFE AND LOW MAINTENANCE IN

- Oil refineries
- Textile finishing plants
- Chemical and food plants
- Pulp and paper mills
- Mines and mineral refining

AND IN SUCH APPARATUS AS

- Laundry machinery
- Dish-washing equipment
- Gasoline and fuel oil lines on motors, burners, etc.
- Fire extinguishing steam lines

ONLY THE SWINGTITE HAS IT—

ROLLER ACTION

As the valve is opened or closed, guide rims (A) around the seating surfaces of discs roll freely over guide tracks (B) cast in the body, distributing wear evenly, dislodging foreign matter, and providing a polishing action for seating surfaces. This rolling disc and track construction lengthens valve life and assures maximum tightness.



JENKINS VALVES

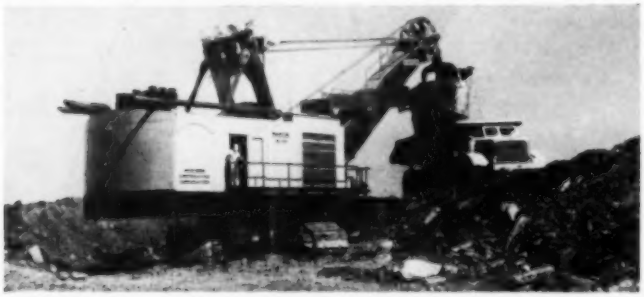
LOOK FOR THE DIAMOND MARK

SINCE 1864 TRADE JENKINS MARK

Jenkins Bros.

Equipment News

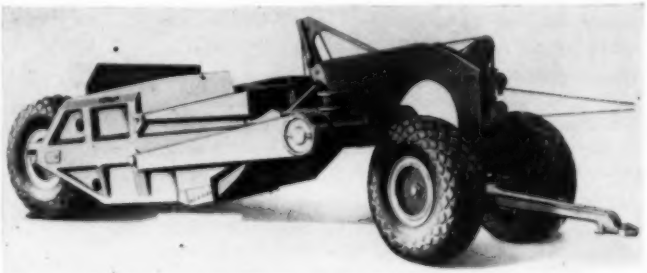
New 10-Yd Unit the Largest Shovel on Two Crawlers (1)



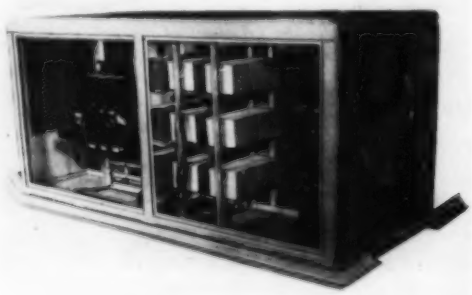
New Marion 191-M 10-cu yd unit is described by the maker as the world's largest, most powerful shovel on two crawlers. Designed as a heavy duty shovel with small-machine cycle time, the unit is expected to be particularly adaptable for use with the newer bigger haulage units. Among its features cited by the manufacturer are: more strength and digging power, in digging effort and speed, per yard of capacity; greater travel speed and maneuverability than most small machines; loading of trucks in the 50-ton class in three or four passes; quick loading of gondola cars; heavily built for toughest digging; electric or diesel-electric power; Ward-Leonard control; "Amplidyne" or "Rototrol" application of electric power; and a production potential of over half a million yards per month. Full details are offered by *Marion Power Shovel Co., Marion, Ohio*

THE POSTAGE-FREE CARD facing p 124 will bring you more details on any item in this section. Just circle the numbers, sign card and mail.

Scraper Provides 40% Greater Capacity (2)



With over 40% more struck capacity than previous models, the Caterpillar No. 90 scraper is designed to increase earthmoving output when used with D8 tractor power. By addition of top extensions or sideboards, the unit's struck capacity of 21.2 cu yd can be increased to 25.5 yd and heaped capacity from 27 to 31 yd. In moving dirt, the "Cat" scraper uses a hard-surfaced reversible cutting edge and carries material in a flat double-bottom bowl of high-tensile steel, with operation by a "Cat" cable-control unit which can be mounted on the rear of the tractor to provide positive loading and ejection. When loaded, the scraper distributes 60% of the weight on the rear tires, it is said. Full operating data is available from *Caterpillar Tractor Co., Peoria 8, Ill.*



Selenium Rectifiers for Efficient Power Conversion (3)

Joy Mfg. Co. has concluded an agreement with Clark Electronic Laboratories for exclusive sales rights in the mining industry for "Celab" selenium rectifiers, said to offer many advantages for conversion of AC to DC underground. According to the manufacturer, the units are considerably more efficient than m-g sets, particularly when load is reduced, and their unusual efficiency at light loads permits leaving them in circuit continuously. Reportedly, Celab rectifiers are lightweight, require no attendance, last almost indefinitely with little or no maintenance and, unlike mercury-pool rectifiers, never pass power in a reverse direction. An advanced plate design, it is said, results in maximum AC voltage, R.M.S. per cell, of 50 as opposed to 18- to 26-v ratings of conventional selenium rectifiers. Bulletin RES-810 offering full data is available from *Joy Mfg. Co., Pittsburgh 19.*

New Machine Bit Developed for Severe Cutting Conditions



A new cutter bit, Style UR, is being manufactured by Kennametal Inc., Latrobe, Pa. Bit is designed for faster cutting where shock conditions are severe, such as in the Continuous Miner, and in seams having large amounts of rock and other hard impurities. Features of the new UR Bit are its hard insert of Kennametal tungsten-carbide, and a special shank design that holds the insert firmly on four surfaces. Performance to date shows reduced cutting costs in rugged, rock-laminated seams.

●

Hollow Drill Rod For Roof Pinning

Hollow drill steels have been adapted by Kennametal engineers for use in the wet drilling of roof bolt holes. A square hole is formed at the end of the rod to accommodate the Kennametal HFD Bit. The bit has been adapted for wet drilling by grooving two sides of the shank to afford a passage for water. The advantage of water, besides controlling silica dust, is increased bit life.

●

Coal Company Reduces Bit Cost 50 Percent

Peters Creek Coal Company Superintendent, James Savilla, reports that bit cost over a base period of two months has been reduced approximately 50% by changing from steel to Kennametal. The cost reported was $187 for the use of steel, $92.50 over the same period using Kennametal. Other advantages in speed, and ability to drill rock were cited.

●

Ivan J. (Dutch) Kinter Joins Kennametal Sales and Service



With the appointment of Ivan J. (Dutch) Kinter, effective July 1, as a Kennametal sales and service representative, Kennametal has representation in all of the major coal and non-metallic mineral producing centers of the United States. Mr. Kinter's territory will include eastern and southern Colorado, New Mexico, and Arizona. His headquarters will be in Carlsbad, N. M.

FAST WAY to drill ANY roof



Your mine roof, whether medium or hard, can be drilled faster and more easily with one of the types of Kennametal Bits illustrated above.

The RD Bit, with prongs angled for strong digging action, rotary drills boney, shale, and slate. The sturdy HFD Bit is used in the hardest material that can be rotary drilled with a carbide cutting edge, offers added drilling speed because the slotted-blade design eliminates the point of zero velocity. In formations too hard for rotary drilling, the PT Bit, with three Kennametal blades, gives more footage, faster (by about 10%), than any other multiple-point bit, and minimizes the tendency to over-penetrate when entering softer roof.

These bits can do a better job for you because (1) their unique Kennametal cutting edges resist wear and shock better than any other carbide, stay sharp up to 100 times longer than steel and (2) Kennametal tool design—often imitated but never equalled—assures great strength and smoother, safer, trouble-free operation.

One, or all, of these Kennametal Bits can help you get fast, low-cost roof-drilling. Your Kennametal representative will be glad to go into your mine and demonstrate them for you. Contact him today! Kennametal Inc., Latrobe, Pa.

Names of Kennametal Representatives appear in the McGraw-Hill Mining Catalogs

KENNAMETAL®

DRILL BITS • MACHINE BITS • ROCK BITS • ROOF BITS

Specialists in Coal Cutting and Coal Drilling with Tungsten-Carbide Tools

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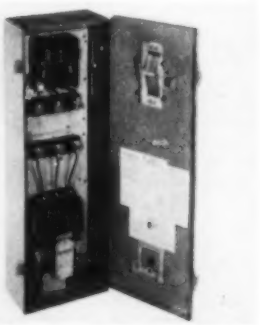
Power Stud Driver Is Fast and Safe (4)

Newly announced Model 450 Remington cartridge-powered stud driver weighs slightly over 5 lb and can be operated by one man at a sustained speed of five or more stud settings a minute in steel up to ¾ in thick, concrete, wood, brick, asbestos siding and roofing and other structural materials, the maker says. The power load varying with job requirements is indicated by the varying colors of the cartridge heel cap, and studs used are made of specially developed steel alloy and are available in 20 different sizes in four general types from ⅝ to 2¾ in long. Several safety features prevent accidental firing and operator is protected by a neoprene-lined steel muzzle guard. Bulletin 939 giving operating details and prices for the units, cartridges and studs is offered by the *Remington Arms Co., Inc., Industrial Tool Div., Bridgeport 2, Conn.*



New-Type Metal-Clad Switchgear (5)

New standard line of General Electric metal-clad switchgear, in ratings from 2,400 to 13,800 v, 150 to 500 mva, is said by the maker to offer many new design features while providing completely pre-engineered units for most commonly encountered kinds of power apparatus and circuits. Design improvements in the magne-blast circuit breaker permit interchanging a maximum number of parts among breakers of different ratings. Another new feature is an electro-mechanical control device, built integral with the breaker mechanism, which is the heart of a control circuit system identical for all breakers operated from the same control voltage. Other changes include a new and improved insulating material used throughout, a completely welded framework and a simplified breaker elevating mechanism. Full data from *General Electric Co., Schenectady 5, N. Y.*







Three Motor Control Units For Varied Service (6-8)

Three new Westinghouse control units have been announced for specific applications. All feature a self-indicating slamproof handle that can be locked "OFF" by up to three separate padlocks.

(6) Class 11-204-N combination across-the-line motor starter (left) has an improved-design fusible disconnect switch, mainline fuse clips and a Life-Linestarter mounted in a common enclosure. It is available in NEMA Sizes O through Z, in four types of enclosures, for 3-phase operation up to 600 v, 60 cycles.

(7) Class 11-206-N rain-tight outdoor motor control units (center) consist of a combination across-the-line starter with circuit breaker in a rain-tight enclosure, with a built-in START-STOP pushbutton or HAND-OFF-AUTO selector switch. The units are available in NEMA Sizes 1 through 5, in standard voltages of 220 and 440 v, but with proper coils are suitable up to 600 v.

(8) Combination across-the-line motor starter with circuit breaker (right) has the components mounted "side-by-side" for use where such mounting is desired because of space or arrangement. The starter is available in Sizes O, 1 and 2 in sheet-steel enclosures for NEMA Types I, IA and V can be supplied with a wide range of operating modifications.

Circling the number in parenthesis on the postage-free card will bring you additional data on any of the three units available from *Westinghouse Electric Corp., Pittsburgh 30.*

New Organization to Make Disposable Bits (9)

A complete new line of "DBT Throwaway" forged steel bits for coal mining is now being manufactured by Drill Bit & Tool Co., a newly formed subsidiary of Mackintosh-Hemphill Co., Pittsburgh. According to the announcement, the new low-cost bits will permit faster drilling; assure a smooth clean hole and longer bit life; and are made in a size range from 1¼ to 2⅝ in. They are being manufactured in a new factory building at Midland, Pa., which also houses new

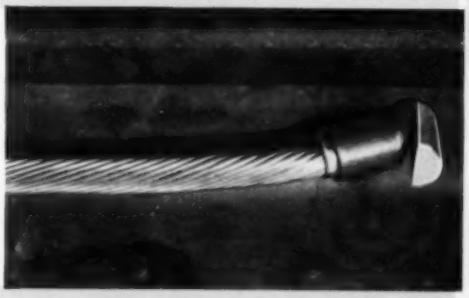
CUT BONDING TIME BY 75%



Drilling rail web with an O-B Electric Mobildrill.



Second terminal is tightened in hole with a few hammer blows. 20,000 pounds of expansion pressure hold the terminal permanently tight.



The completed job. Bond may be easily reclaimed by driving the wedge from the hole with a few hammer blows from opposite side of rail.

Bond four times as fast with O-B Wedge Bonds! In average haulage conditions your two-man welding crew can probably install five bonds per hour. During the same time, we know that one man can install ten O-B Wedge Bonds. When you reduce this to man-hours, it develops that 100 welded bonds represent 40 man-hours of installation time, while the same number of O-B Wedge Bonds require only ten hours! A saving in time like this is certainly worthwhile, isn't it? - especially when you consider that there are other advantages in wedge bonding. Repeated use, for example, makes your supply of bonds go further. Metal-to-metal contact between the bond terminal and the rail makes a better electrical connection than a welded application.

Make your bonding dollars last longer and do more by specifying O-B Wedge Bonds on your next order.

Ohio Brass

MANSFIELD OHIO, U.S.A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

4284-M

JOINS 'EM RIGHT KEEPS 'EM TIGHT



The COMPLETE Victaulic System is the EASIEST WAY TO MAKE ENDS MEET! Victaulic offers a complete line of Full-Flow Elbows, Tees and other fittings, all carefully designed for free-flowing efficiency and leak-tight dependability.

Join 'em right – the Victaulic way – and you'll be sure of easy, quick hook-ups. Pipe ends are joined by a simple two-bolt coupling. A speed or T-wrench is the only tool required. AND Victaulic Couplings keep 'em tight ... pipe joints stay positive-locked, leak-proof. Victaulic Couplings are designed to stand up under extreme pressure, vacuum, or strain conditions.

Preparing those pipe ends is a cinch the Victaulic way..."Vic-Groover" grooves 'em automatically in a jiffy, more than twice as fast as a conventional pipe threader!

SAVE time, work, and dollars on your piping construction and maintenance. JOIN UP with Victaulic.

Make your next piping job ALL VICTAULIC. Write today for Victaulic Catalog and Engineering Manual No. 44-8A.

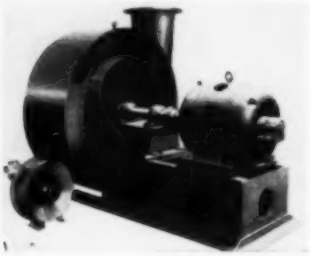
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The easiest way to make ends meet
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PIPE COUPLINGS AND FITTINGS

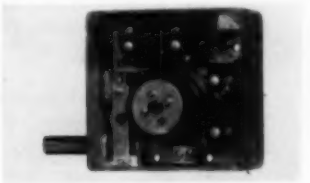
Copyright 1951, by Victaulic Co. of America

machinery for the production of a supplemental line of hollow steel drill rods of carbon-manganese-silicon steel, which are designed especially for use with the DBT Throwaway bits. Full details from *Drill Bit & Tool Co., Pittsburgh 3.*



New Blower Line Offers Larger Capacities (10)

A new Billmyre line of fabricated-steel blowers of larger capacity offer standard models ranging up to 200 hp, with new designs made possible by the latest steel-cutting and continuous-welding methods. In addition to larger size, the new line offers weight saving and space economy not heretofore feasible in cast-blower construction, the company says. Three styles are offered: Model SG (multi-stage) and the SM (single stage) operating at 3,500 rpm; and Model ST operating at 1,750 rpm. Standard outlet pipe sizes run from 4 to 24 in, all flange fitted, and blower outlets may be oriented in any of 14 positions, with delivered air pressures up to 3 psi (5.3 in mercury). As with other Billmyre blowers, constant pressure is maintained irrespective of air volume, but power consumption is directly proportional to air volume so that half-capacity usage means only half-cost operation, it is said. Literature and specifications available from *Billmyre Blower Div., Lamson Corp., Syracuse, N. Y.*



Limit Switch Provides Reverse Operation (11)

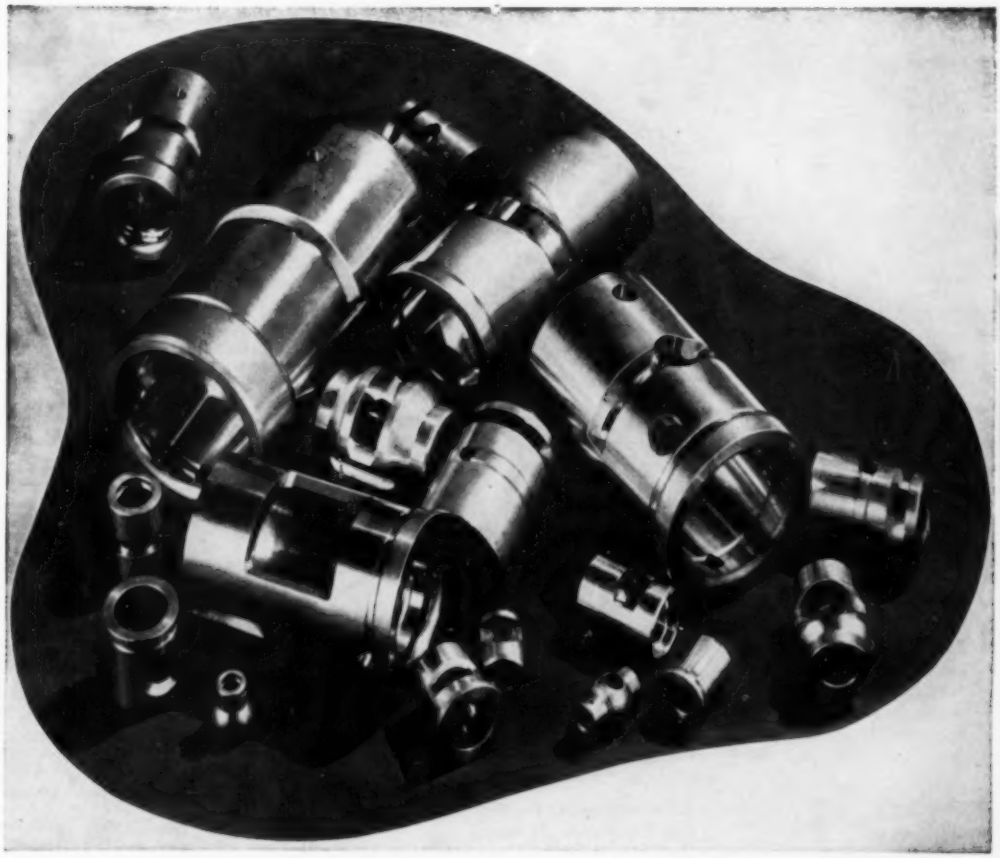
A new G-E rotating-type limit switch for application where reversing operation is to be coordinated with the number of revolutions of a motor shaft or driven equipment supersedes four previous forms and is said to be usable for controlling motor-operated doors and windows, valves on machine

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AND TYPES
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● The correct bearing for practically every electric bearing application is now available to you. Avoid delay or costly substitutes. For the widest selection, the quickest service, and the finest electric motor bearings, simply call your "Bearing Specialist" listed below, and specify Bunting, the best electric motor bearings.



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FOR LIFTING JOBS IN AND AROUND MINES



No. 514-MT
For THIN SEAM
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For THICK AND THIN SEAM
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DUFF-NORTON 5 TON RATCHET LOWERING JACK

Mining men everywhere tell us, "Duff-Norton 5 Ton Ratchet Lowering Jacks give dependable, long-lasting service in all lifting jobs in and around mines. They speed up rerailing of locomotives and cars; brace cutters, loaders and continuous mining machines; increase efficiency in track maintenance and shop repair work." You can't beat that for a recommendation. Why not order these jacks for your mine.



Write for Handy Mine Jack Guide!

You should have a copy of this handy booklet, which illustrates and describes in detail jacks that can make your lifting and lowering jobs easy and economical. Write for your copy today.



THE DUFF-NORTON MANUFACTURING CO.

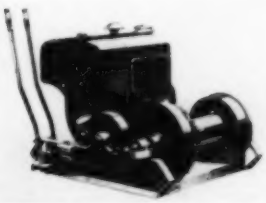
MAIN PLANT and GENERAL OFFICES, PITTSBURGH 30, PA.—CANADIAN PLANT, TORONTO 6, ONT.

"The House that Jacks Built"

tools, travel limits on machinery, etc. The unit is easily adjustable to operate from 4 to 110 turns of the driving shaft, and is housed in a zinc die-cast case with removable cover, measuring approximately 4 in square and 2 in deep. It is also available in watertight and explosionproof forms in cast-iron cases.—*General Electric Co., Schenectady 5, N. Y.*

Lead-Clad Steel and Copper Available (12)

Following years of experimentation and development, two new metals which, it is said, can drastically reduce the waste caused by sulphuric acid have been announced by Knapp Mills, Inc. First of the new metals is Ferrolum, which is made by inseparably bonding lead and steel in such a way that the finished product combines lead's unique immunity to sulphuric acid with steel's strength. The other, called Cupralum, is made by inseparably bonding lead and copper, retaining the best features of both metals, particularly lead's acid resistance and copper's high electric conductivity and heat transfer value, the maker reports. The two metals can be used in various ways to supplant inadequate materials in current use on standard equipment, the company says, reporting that they are strong, can be machined and provide high density without the bulk of concrete. A 22-p bulletin providing full technical details is available from *Knapp Mills, Inc., 23-15 Borden Ave., Long Island City, N. Y.*



Hoists Controlled by Hydraulic Clutch (13)

New series of King hoists provide hoisting control through an oversize hydraulically operated clutch, with external contracting 3-in band brakes used to insure safe stopping power, along with automatic safety ratchets standard on all models. Model 2500-H, powered by 25-hp Wisconsin gasoline engine, has a capacity of 6,000 lb at 100 fpm as standard, with wide range of speeds and capacities available. Model 1300-H, driven by a 13-hp Wisconsin gasoline engine, has a capacity of 3,000 lb at 100 fpm, and also has a wide range of speeds and capacities. King hoisting frames for use with electric or diesel power units can be purchased separately. Bulletin 450 gives full details.—*King Mfg. Co., Chicago 22.*



Dry Photocopies in 30 Sec Without Mess (14)

New Auto-Stat will produce dry photocopies of anything almost instantly, without the slow, messy developing, fixing, washing and drying ordinarily required by usual photocopy methods, the maker says. Based on an entirely new principle of instant and automatic developing and fixing, it requires no training or special skill to produce a clear black-and-white photo-exact copy of any original in any office, by a two-step process that takes less than 30 sec, it is said. The Auto-Stat is compact, occupying no more space than a typewriter, and needs no dark room or running water, etc. It can handle sheets up to 11x17 and will duplicate material at the rate of 100 copies per hour or more. Bulletin available from the *American Photocopy Equipment Co., Chicago 14.*

Equipment Shorts You'll Want to Check



(15) NEW HEAVY-DUTY PLASTIC ELECTRICAL TAPE designed for applications requiring more-than-average mechanical strength is known as "Scotch" brand electrical tape No. 21. The maker recommends it for anti-corrosion protection for pipes, cables and equipment laid underground where resistance to cuts and abrasion by rocks during backfill is important, and also for protecting and insulating cable and high-tension leads subject to wear, abrasion and rough handling, and for bus bars carrying high voltage. The tape is available in 36-yd rolls ranging in widths from ¾ to 16 in from *Minnesota Mining & Mfg. Co., St. Paul 6, Minn.*

(16) TELEPHONE AMPLIFIER holds receiver and increases volume of incoming phone calls as desired,





New Elreco Harp

Supports Slider at Contact Level!

IN BOTH HIGH AND LOW COAL

Current is collected more efficiently than ever before with Elreco's newly-developed Trolley Harp and Slider!

Ingenious yet simple design allows the Slider to pivot on the Harp *at wire contact level!* This means that tilting and consequent arcing are reduced to a minimum. It means that both Slider and trolley wire wear less, last longer. And the resulting smooth operation makes for less dewiring, less time lost.

That's not all:

Slider pivots for use in *both* high and low coal.
Ample bearing surfaces machined to lengthen life.
Simplified construction for easy replacement of worn Sliders.
Self-aligning spring automatically aligns the Harp and Slider.
Dual Cable Clamp to accommodate up to two 4/0 motor cables.
All parts are made of sturdy malleable iron.
A heavy super-flexible shunt is provided.

Write today for latest price and delivery information on the *new* Elreco Trolley Harp and Slider. Address me, personally, at 2919 Cormany Ave., Cincinnati 25, Ohio.

PRESIDENT

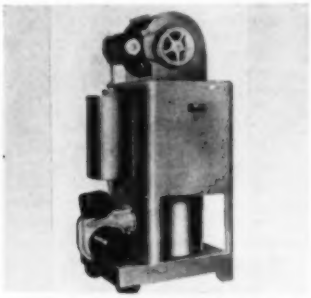
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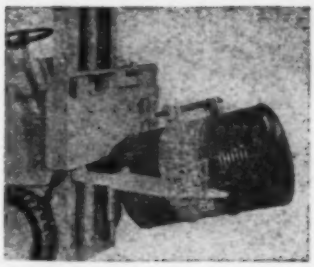
while leaving user free to move about room, check files, etc. By amplifying conversations, the "Addiphone" can also be used to conduct group discussions or conferences and to facilitate taking of notes without need for holding receiver. The unit plugs into any light switch and has no electric connection with the telephone system. Trial offer or literature available from *Exim Trading Corp., Addiphone Sales Div., New York 4.*



(17) FOR HEATING WORKERS indoors and out, new 140,000 Btu Fageol Model PW-140 heat unit is said to employ an entirely new principle of forced-air circulation, blowing warm air out of the machine's base from all sides along the floor and creating a 6-ft-high heat blanket that eliminates the necessity for heating vast overhead areas to keep workers comfortably warm. Said to reduce heating costs by as much as 90%, Model PW-140 is designed to comfortably heat workers in areas up to 3,000 sq ft of confined space or 1,600 sq ft of open space, and burns fuel oil or kerosene. A 200,000 Btu model known as PW-200 also is available.—*Fageol Heat Machine Co., Detroit 11.*

(18) A SAFE WAY of tilting and emptying heavy drums is provided by the new Baker manual "Drum Up-Ender," consisting of two shoes which slip over the forks of any standard fork truck. The shoes have rubber-faced grab plates that clamp around

CARD USERS NOTE—Please be sure to give your name, position and company to insure proper handling of your request. Since some cards have been received without names, we would be glad to have you check us if you have no response to your request within a reasonable time.



the drum and a handle used to up-end drums. Drums are carried in a vertical position and can be tilted forward to a horizontal position for stacking, or 45 deg below horizontal for emptying. — *Baker Industrial Truck Div., Baker-Raulang Co., Cleveland 2.*

YES—I would like more information . . .

Please send me catalogs or further information about the items from the Equipment News Section whose numbers are circled. (January 1952)

1	6	11	16	21	26	31	36	41	46
2	7	12	17	22	27	32	37	42	47
3	8	13	18	23	28	33	38	43	48
4	9	14	19	24	29	34	39	44	49
5	10	15	20	25	30	35	40	45	

In addition, please send me data on these OTHER products advertised in this issue (give name and page number) .....

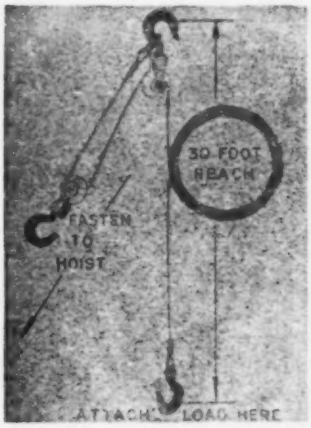
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Name (Print) ..... **Position** .....

Company .....

Address .....

NOT GOOD if mailed after March 1, 1952



(19) LIFTING OF MOTORS, pipes and other equipment to ceilings or construction locations as high as 30 ft is easy with this new 6-lb accessory, normally used in conjunction with the 8½-lb Lug-All hoist, the maker says. The hoist is normally operated from the ground and only the 6-lb Longlift need be taken up the ladder for overhead suspension. Capacity is 750 lb but can be doubled with the use of two units.—*Lug-All Co., Wynnewood, Pa.*

USE THIS CONVENIENT CARD

. . . TO GET MORE INFORMATION on products and bulletins mentioned in this Equipment News Section or for data on any product advertised in this issue. Circle item numbers, tear out and mail.

(20) TIME SWITCH—New G-E T-471 cord-and-plug model general-purpose time switch is a low-cost switch designed for easy plug-in installation, automatically controlling electrical circuits for one "on" and "off" operation during any 24-hr period, with additional riders available. The T-471 has a synchronous Telechron movement, is self-starting and self-lubricated. Data available from *General Electric Co., Schenectady 5, N. Y.*

(21) BROKEN CONCRETE FLOORS can be restored quickly with "Instant-Use" without closing off an area of industrial floor while waiting for newly installed patches to set, since an Instant-Use patch takes traffic almost the moment it's put down, the maker says. Instant-Use is recommended for repairing breaks in concrete due to relocating equipment, as well as for complete overlays. Trial order plan and descriptive folder available from the *Flexrock Co., Philadelphia 4.*

EQUIPMENT BULLETINS AVAILABLE

(22) FOR WIRE-ROPE AND SLING USES, 48-p "Sling Handbook and Riggers Manual" compiled by Union Wire Rope technical staff illustrates 11 sling types and covers their dimensions, weights and safe working loads, together with data on various sling fittings and care of slings and step-by-step instructions for splicing the new braided wire sling fabric. The comprehensive riggers manual illustrates and gives step-by-step instruction on wire-rope splicing and includes data on efficiencies of wire-rope attachments and direction for attaching sockets or ferrules. Available from Union Wire Rope Corp., Kansas City 3, Mo.

(23) ELECTRICAL MAINTENANCE SLIDEFILM—Augmenting its recently announced "Productive Maintenance Program," General Electric Co., Schenectady 5, N. Y., now offers a 12-min black-and-white sound slidefilm for showings to interested groups. Called "Productive Maintenance," the film presents a quick, visual report on the main elements of the program, includes three case histories and reviews its six major recommendations for good maintenance. Arrangements for a showing can be made through any of the company's apparatus sales offices or service shops.

(24) NON-CLOGGING SPRAY NOZZLES for cleaning all kinds of materials are described in Folder 2386 released by Link-Belt Co., Chicago 1. The bulletin shows how simply the nozzle can be applied by merely drilling a plain hole in the pipe and attaching deflector with a U-bolt. Available for 1- to 2-in pipe with orifices of 5/32 to ½ in in diamter at pressures of 20 to 100 psi.

(25) NEW 16-MM COLOR SOUND FILM showing the Euclid Twin Power scraper in coal stockpiling and reclamation work is entitled "More Power to You." The 10-min film is available on loan to interested groups and arrangements can be made through Euclid distributors or by writing the Euclid Road Machinery Co., Sales Development Dept., Cleveland, 17.

(26) HYDRAULIC JACKS—Bulletin 51-R issued by Templeton, Kenly & Co., Chicago 44, offers complete information, including specifications and application data, on Simplex hydraulic equipment from 10 to 100 tons. Covered are Simplex Re-Mo-Trol pumps and rams, with accessories and

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THE EDITOR, COAL AGE

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NEW YORK 18, N. Y.

attachments, Simplex-Jenny hydraulic pullers, standard hydraulic jacks and the new Simplex Rol-Toe foot-lift hydraulic jacks.

(27) DIAMOND CORE DRILLS, equipment and supplies in the Longyear line are illustrated and described in Bulletin 83 available from the E. J. Longyear Co., Minneapolis, Minn. Specifications, capacities and operating data are included for skid-, trailer- and truck-mounted models.

(28) SCRAPER—Bulletin TC-707 describing the new Wooldridge Model TC-S142 Terra Cobra self-propelled scraper covers operational features and mechanical details of the unit, which has a heaped capacity of 17.5 cu yd and is powered by a 225-hp Cummins diesel engine. Available from the Wooldridge Mfg. Co., Sunnyvale, Calif.

(29) CONTINUOUS WEIGHTING AND FEEDING of dry materials at capacities from 100 to 100,000 lb per hour is possible with the Omega belt gravimetric feeder, according to Bulletin 35-F5B offered by the Omega Machine Co., Providence 1, R. I. Features and operation of the vibratory feeder, weighbelt, scale beam and other parts are described along with accessories which permit handling of floodable-finely-pulverized materials.

(30-32) LIMIT SWITCHES — New bulletins covering three limit switches available from the General Electric Co., Schenectady 5, N. Y., contain descriptive and application information, switch ratings and other data. For Bulletin GEA-5704 on the rotating-type limit switch, for application where reversing operation is to be coordinated with the number of revolutions of a motor shaft or driven equipment, Circle No. 30 on the postage-free card. Circle 31 for bulletin GEA-5705 describing the lever-type limit switch for use to make or break a control circuit at a certain point in the travel of a machine part of mechanism. Circle 32 for the third publication, GEA-5707, dealing with the track-type limit switch offered with four interchangeable operating heads for a wide variety of general purpose applications.

(33) WELDING AND CUTTING EQUIPMENT made by the Victor Equipment Co., San Francisco 7, is presented in its new Apparatus Catalog 20-C. The 64-p catalog offers complete information on a wide range of Victor apparatus and is designed to make selection and ordering as easy as possible.

(34) SOUND - POWERED TELEPHONES made by the United States Instrument Corp., Summit, N. J., are covered in revised Catalog 400-B. New items of special interest include an explosionproof sound-powered telephone handset and master-station sound-powered telephone systems for industrial applications of 8, 16 or 24 stations per system.

(35-40) SPECIAL - APPLICATION PUMPING — Six separate bulletins giving detailed data on its line of pumps for handling difficult materials are offered by Pettibone Mulliken Corp., Chicago 51. For the individual bulletins circle the numbers in parenthesis on the postage-free card as follows: (35) Diamond Alloy for abrasion-resistant pump parts and construction; (36) "Hi-Brasive" pumping with Diamond Alloy hydraulic material-handling equipment; (37) Diamond Alloy pit pumps; (38) dredge sand and gravel pumps; (39) industrial slurry pumps; and (40) slime or sludge pumps.

(41) JET PUMPS—Sizes, capacities and operating characteristics of the Penberthy line of jet pumps are covered in detail in Bulletin 512 available from the Penberthy Injector Co., Detroit 2. Available for wide range of application, the units can be used on some pumping jobs where mechanical pumps cannot be utilized, it is said.

(42) SWITCH AND OUTLET BOX GUIDE, a 16x22-in wall chart issued by General Electric, gives box catalog numbers, sizes, information on number and sizes of conductors permitted in each box, and additional data on boxes reprinted from the National Electrical Code. Designed to help pick the right box for a particular job, Chart 18-81 is available from the Construction Materials Dept., General Electric Co., Bridgeport 2, Conn.

(43) LUBRICATED PLUG VALVES —Catalog covers the entire line of Porter lubricated plug valves said to be particularly useful where positive, leak-proof operation as well as corrosion resistance is demanded. The bulletin includes full data and ratings on Porter valves ranging from ½ to 12 in and is available from the Porter Valve Div., H. K. Porter Co., Inc., Tulsa 1, Okla.

(44) ICE AND SNOW-MELTING chemical crystals, called Ice Rem, possess a thawing capacity 30 times greater than that of salt, leave no messy residue and will not harm tires, shoes, asphalt surfaces or concrete, according to Bulletin L-4656 available from Speco, Inc., Cleveland 9.

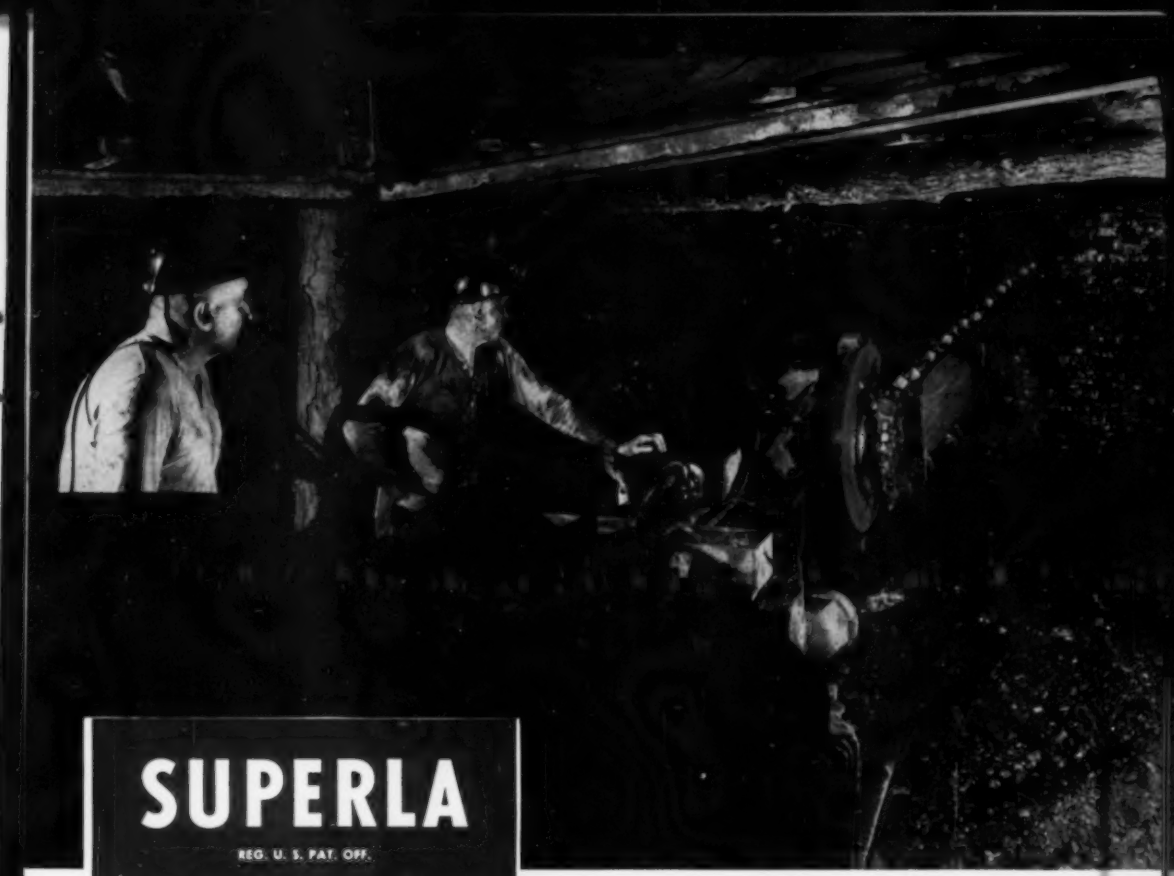
(45) INDUSTRIALLY-PROVED INSTALLATIONS of Ledeen cylinders for various purposes are described in Bulletin 152 from Ledeen Mfg. Co., Los Angeles 15. Entitled "Use a Cylinder and Save a Man," the folder shows how in some instances manual power is either eliminated or reduced, while in others work is done automatically or by remote control or with operation speed increased.

(46) ANTI-RUST PAINT—Bulletin 136-11 available from the Monroe Co., Inc., Cleveland 6, discusses the application of a "Rust-Cure," which can be applied on rusted surfaces without wire-brushing, scraping or sandblasting and seals rusted surfaces and retards further rusting action, according to the maker. It is available in black, aluminum and clear and can be applied by brush, dip or spray methods, indoors or out.

(47) ROOF DRILLING BITS AND RODS in the Kennametal line are covered in Bulletin M-147, with full details of design, operation and performance of exclusive features. Kennametal, Inc., Latrobe, Pa.

(48) "WINTERPROOFING COAL WITH OIL," is the first in a series of bulletins on the use of oil in coal preparation to be issued by the Ashland Oil Refining Co., Inc., Ashland, Ky. It discusses the problem of frozen coal, the causes and correction.

(49) HOW TO REWIRE a building and increase electrical capacity up to 50% without replacing present conduit is explained in a new 12-p booklet issued by Rockbestos Products Corp., New Haven 4, Conn. Specifications and installation of Rockbestos A.V.C. cable are included.



SUPERLA

REG. U. S. PAT. OFF.

Mine Lubricant No. 0

Cutting . . . lubrication troubles

● Operators of this midwest mine depend on SUPERLA Mine Lubricant No. 0 for trouble-free lubrication, not only in the gear cases of their three cutters, but in the transmissions of two Goodman loaders as well. This one lubricant, recommended by a Standard Oil lubrication specialist, does both jobs with equal success, and simplifies stocking of lubricants at the mine.

In three years of operation with SUPERLA Mine Lubricant there have been no cases of downtime of loaders or cutters due to faulty lubrication. Wear has been held to a minimum. Warm-up time for the loaders has been eliminated.

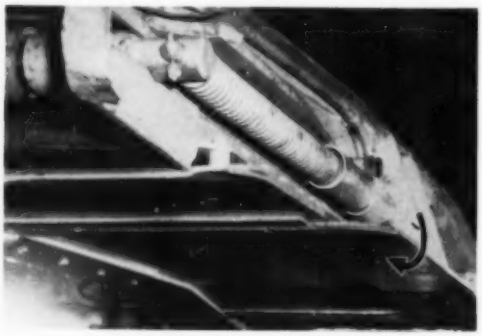
SUPERLA Mine Lubricant has cut lubrication troubles in this mine . . . it can do the same in your mine. There's a Standard Oil lubrication specialist located near you who knows mining equipment and how to lubricate it best. He is at your service for on-the-job help on any problem related to lubrication. Why not call on him today? Just contact your nearest Standard Oil office, or write: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY STANDARD *(Indiana)*

Operating Ideas

Peabody Repairmen Lengthen Loading-Machine Service

The constant ability of maintenance men to improvise and keep machines moving is nothing short of miraculous, comments the Peabody Coal Co.'s magazine, *Peabody People*, in reporting these three ideas originated by repairmen at its mines. New high-speed mining methods make maintenance and repair increasingly important in the modern mine, it points out. Perhaps one of these ideas will pay off for you, too . . .

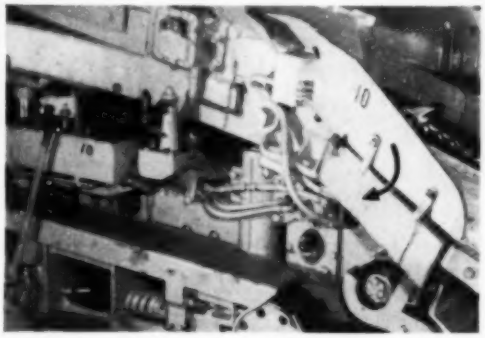


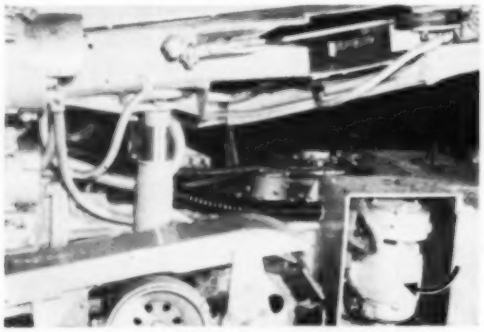
Preventing Pounding Of the Rear Conveyor

IN SHUTTLE-CAR LOADING, the rear conveyor and jacks on the 11-BU units are subjected to continued pounding, with excessive damage to both a result. As a remedy that has lengthened conveyor operating life, steel reinforcement plates were added to the underside of the boom, as shown in the view of a 11-BU rear-conveyor assembly (left). The plates are detachable to permit access to the bottom pan section.

Lubricator Boosts Crawler-Track Life

IMPROVED HANDLING and longer track life on the 11-BU machine have been gained by adding a gravity-fitted oil tank (right), which provides lubrication for the crawler tracks and assembly. Before, tracks and assembly were run dry since no method of lubrication was included on the unit. Lubrication can be controlled by the machine operator.





One Way to Keep The Main Motor Cool

MULTI-SHIFT PRODUCTION raises a serious problem—how to keep the main motor on a loader cool during almost continuous operation.

A trial solution to the problem is a high-speed blower (left) mounted on the 11-BU, which blows a continuous blast of air on the main motor through a flexible tube.

Previously, on single-shift work, the motor lasted 3 to 5 yr. Now, with two- and three-shift operation, the same motor lasts only 3 to 5 mo. Much of the wear is caused by overheating, which it is hoped the blower will help counteract and thus add to the life of the motor.

GOULD

Plus-Performance Plan

REGULAR WATER ADDITIONS

ADD MONTHS TO BATTERY SERVICE!

The amount of water used by a battery indicates its general condition. That's why regular, systematic watering is so important to maximum battery service. The GOULD PLUS-PERFORMANCE PLAN gives you complete technical information, not only on how to establish a regular watering routine but on practically every problem connected with storage battery use.

Comprising manuals, articles, specifications, bulletins, charts, graphs and forms, the GOULD PLUS-PERFORMANCE PLAN tells you how to select, charge and handle, maintain and determine the condition of your batteries. Use it consistently and you can improve your battery performance as much as 50%! All material is free. A request will bring descriptive booklet by return mail.



WATERING ROUTINE CUTS DOWN-TIME, BOOSTS PRODUCTION

Level of electrolyte should be maintained between low and high level points. The minimum low level point should be above the splash cover. Maximum high level point is just under the bottom of the vent-well in the cover.

It is normal for electrolyte level to decrease very gradually with use. Rapidity of decrease will depend upon how much charge it receives over and above what it requires. Normally, a battery does not require water more often than once in 1 or 2 weeks when it is in full cycle service.

Only water that is known to be suitable for storage batteries should be used. It should be pure and free from any contamination. Distilled water is recommended. Water should be kept in clean containers of glass, plastic or porcelain with cork, glass or rubber stoppers.

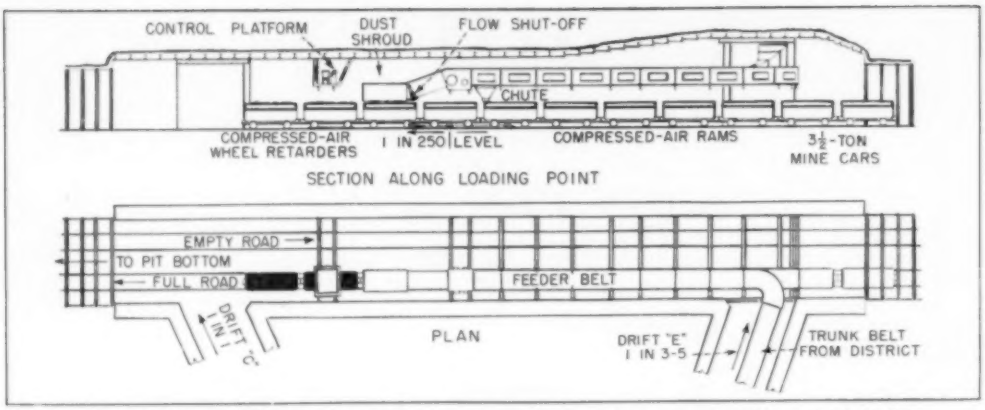


The GOULD "Thirty" with "Z" Plates—
America's Finest Mining Battery

GOULD STORAGE BATTERIES

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, NEW JERSEY

Always Use Gould-National Automobile and Truck Batteries



500-TPH LOADING STATION, operated by one man, provides smooth transition from belt to track haulage.

Modernized Colliery Features 500-TPH Loading Station . . .

PERLETHORPE loading station at recently-modernized Thoresby Colliery, where coal is mined beneath Robin Hood's Sherwood Forest, is designed to permit one man to handle the transfer of 500 tph from a 42-in belt conveyor into 3½-ton steel mine cars, according to M. C. Potts, mining research engineer, East Midlands Division, National Coal Board.

At Thoresby, a Bolsover Colliery Co. operation, coal is mechanically mined from longwall sections by A. B. Meco-Moore machines, as described at length in the article beginning on p. 94. Face conveyors discharge to district belts and the district belts discharge to the 3,150-ft-long secondary belt which transports the coal to the loading station.

At a speed of 315 fpm, the secondary belt, on a gradient of 3.5 in 1 in favor of the load, carries the coal to a 60-ft-long 48-in-wide feeder belt which travels at 340 fpm. As shown in the diagram, the feeder belt at the loading station discharges to the car-loading chute.

Westinghouse rams and retarders control the mine cars as they are being loaded, and an automatic door closes the chute when the cars are being moved forward. The operator sits at his controls on a platform above the loading station.

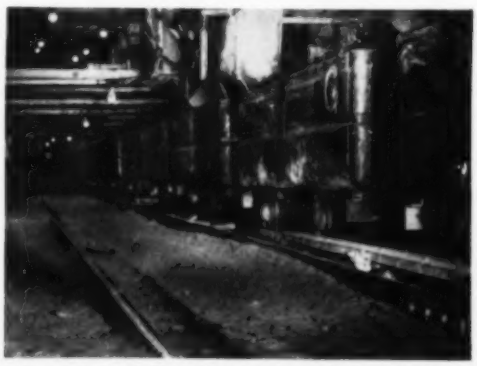
Loaded trips of 30 cars each are hauled 1¾ mi from the loading station to the rotary dump at the foot of the shaft by 100-hp 15-ton Hudswell Clarke diesel locomotives at a maximum speed of 14 mph.

. . . And Photoelectric Haulage Signalling

WITH SEVEN LOCOMOTIVES in service, officials at Thoresby have installed photoelectric cells to actuate the red and green signal lights which control haulageway traffic. At Thoresby, the lights are used to clear or block the single-track roads between double-track by-passes, but the system can be modified for application to any track layout, including junctions and pit bottoms.

The photoelectric cells are mounted in the roof of the roadway, with the lamp housings directly beneath between the rails. As the trips pass over the lamp housings, control relays are caused to operate, thus displaying the appropriate light as a signal to other haulage crews using the same roads.

Any failure of the apparatus, in either the photoelectric cell system, the control lamps or operating relays, will cause the red lamps to shine continuously.





TRIPS OF 3½-TON CARS, 30 cars per trip, are loaded at the Perlethorpe station, then hauled 1¾ mi to the foot of the shaft by 15-ton diesel locomotives. Traffic lights along the haulageway are controlled by photoelectric relays actuated by the rolling stock.

MACK TRUCKS

Keep Pace...

WITH YOUR STEPPED-UP PRODUCTION

Today's conditions call for trucks that can keep pace with accelerated production schedules. More and more truck owners are realizing that trucks are really "Tools of production"... that intensified service makes doubly important the extra durability and sustained reliability they get from hard-working Macks.

Make sure *your* truck equipment measures up to the rigors of present-day demands. See your nearest Mack branch or distributor for the right truck for your particular job. Prove to your own satisfaction that "Built Like A Mack" means uninterrupted production... extra long life... more tonnage moved at lower cost for many years to come.

Mack TRUCKS

outlast them all

Mack Trucks, Empire State Building, New York 1, N. Y.
Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.



In punishing strip mining service, hard-working Mack trucks have won enthusiastic owner acclaim because of their ability to "keep pace" with stepped-up production demands . . . to keep heavy loads moving on dependable, time-saving schedule.



Hose built for the job! That's the reason for Thermoid's excellent reputation among users of hose.

Our customers know they can rely on Thermoid's recommendations . . . whether it's for air, suction, hydraulic, welding—or any of the many types of Thermoid hose built for the coal mining industry.

And men who buy these quality products like the service they get from Thermoid's experienced distributors and sales representatives—and their intimate knowledge of the *buyer's* problems.

Get the hose built for *your* job. Specify Thermoid.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

How to Get More Service From Shovels

By A. E. YORK, Service Manager
Link-Belt Speeder Corp.
Cedar Rapids, Iowa

THE INTERNATIONAL SITUATION and America's increasing defense efforts have created abnormal demands for construction equipment. The unprecedented call for new power shovels and cranes, among others, also has accelerated the demands on such equipment already in use.

It thus becomes more important to keep existing machines in the best operating condition. Delays and shutdowns, which become especially costly under today's conditions, can, however, usually be prevented by a program of planned care and preventive maintenance. In addition, maintenance precautions as suggested here will provide you with longer service life and better performance from the machines you have in operation.

STARTING SHOVEL OFF RIGHT

1. Be sure a qualified serviceman puts the unit in operation properly. The most important periods in the lifetime of a crane or shovel come when they are first placed in service and that immediately following when the user is becoming accustomed to their operation. Qualification of the serviceman naturally is the responsibility of the dealer selling it.

2. Obtain proper instruction on adjustments, care and lubrication at the time of delivery. Since there will always be labor turnover, arrange that operating instructions be recorded and handed down from one operator to another should the original operator leave for another job.

3. Provide maintenance men with details of proper lubrication, available at the time of delivery. Too often, a new shovel or crane is deadlined because of improper care and lubrication. In many cases the problem of too much grease is almost as serious as too little lubrication.

4. Plan a program of systematic care and maintenance, following carefully the manufacturer's operating and instruction manuals. This includes not only proper care and lubrication but also keeping the machine clean and making regular periodic inspections—inspections which will reveal necessary normal adjustments and assure the proper replacement of parts at the right time.

MAINTAINING MACHINES YOU HAVE

With old equipment certain steps should be taken to prolong the natural life of the machine. A few precautions can greatly extend the time between major overhaul jobs.

1. Lubricate at regular intervals—and properly—to eliminate "guesswork." Lubricants, oils and greases should conform to manufacturer's recommendations and should be products of reputable firms. Manufacturer's charts on seasonal changes in viscosity should be followed closely.

2. Examine lubrication tubes periodically. Too often it is discovered too late that a grease tube has failed or become clogged and that grease is not reaching its intended goal. When that happens, some bearing will fail for lack of grease, which also may result in damage to a shaft or other important part. Replacing a shaft or part is often difficult and may result in a long costly shutdown which could readily have been prevented.

3. Inspect operating parts regularly. Clutches should be inspected closely to make sure they are in good condition and adjustment and wearing properly. Linings should be kept clean and free from grit and other foreign particles to eliminate scoring of drums. Center pins should be checked and tightened as needed. Drive chains should be kept in adjustment and sprocket chains examined for undue wear. Bushings should be watched to avert shaft scoring. Engine filters must be changed at specified intervals to safeguard the power plant of the machine.

4. Systemize advance ordering of needed parts. Many parts, such as linings, cables, dipper and bucket teeth are essentially wearing parts and should be kept on hand for periodic replacement. Experience will indicate other parts also that should be kept handy to avoid costly shutdown and delays. By periodic and systematic inspections you can anticipate other required replacements and have them available to install at the most convenient time.

5. Emphasize that machine cleanliness is paramount in good care and maintenance. Good "housekeeping" is conducive to good care and maintenance, and a well cared for machine is invariably also a clean machine. Pride in keeping the machine clean will instinctively encourage the operator to pay close attention to the proper care and mechanical condition of his machine.

6. Inspect cables periodically. A frayed cable should be promptly replaced, particularly if it is a load-carrying cable. Although it may be subjected to little actual running wear, the boom-hoist cable—which is a load-carrying cable—also should be inspected frequently, since its failure could well result in a serious damage or even personal injury. During inspections, all cable connections should also be checked.



PLAN YOUR OVERHAUL

Overhaul jobs, which in normal times may have been undertaken without too much forethought, may assume major proportions today.

1. First determine the extent of the overhaul job needed. This calls for a detailed study and examination, which will also avoid ordering additional material after the original order has been sent in. Definite shipping dates should be received, or, better yet, no equipment should be disassembled until all material is on hand. Not too infrequently a small item out of a large order can tie up a major repair job because of some supplier's inability to live up to a promise.

2. Check local facilities to make certain the job can be completed in the least possible time. If local sources prove inadequate, improvisations can usually be made. Often it is wiser to move the equipment nearer to the proper facilities for repair and overhaul.

3. Consider rebuilding parts, in view of present material shortages, especially those which can be welded back to original dimensions. Track sprockets, track rollers, track shoes—all can be rebuilt with hard-surfacing rod to extend their life. Bores worn oversize can frequently be welded and rebored to standard size to make future replacements easier. Shafting—depending upon application—can sometimes be metal-sprayed satisfactorily. When possible, a plating process should be used to salvage shafts.

4. Plan your overhaul procedure carefully. Complete overhaul jobs if properly planned, can be accomplished with a minimum amount of down time, even considering the present scarcity of material.

GM DIESEL
Case History No. 5011-27

USER: Thomasville Stone and Lime Company, Thomasville, Pennsylvania

INSTALLATION: 3-71 and 6-71 GM Diesels power Joy Heavyweight Champion blast hole drill; 3-71 for rotary and propulsion, 6-71 on compressor and "pulldown."

PERFORMANCE: Replaced 5 small drills. Maximum footage with previous equipment 15 feet per drill in 6¼ hours; with new equipment 180 feet in 6¼ hours. Reduces drilling manpower. Fuel consumption: less than 7 gallons per hour (both engines).



This Diesel replaces five drills

— and more than doubles the footage

GM DIESEL POWER

Big Red TD-24 turns Spoil Piles into Farm Lands



"BIG RED" IRONS OUT THE BADLANDS. When the mighty TD-24 flattens out the spoil piles, the recovered land is rich with crop-stimulating minerals that were deep beneath the surface before the miners churned up the soil to get at the coal. Besides this, commercial fertilizer is added, and the finished result is fine Illinois farm land.

Little Sister Mining Co. reclaims 4,550 acres of strip mine spoil piles

Down in central Illinois, the Little Sister Coal Co. is tackling a major land reclamation project: creating valuable farm land out of 4,550 acres of worthless spoil piles caused by fifteen years of stripping coal out from under an 85-foot overburden.

The mining company has set up a subsidiary—Little Sister Farms—to level out the spoil piles, fertilize the land and sow the crops.

An International TD-24 crawler tractor has been doing this reclamation work since October 1950.

The Big Red TD-24 is ideal for this rough, rugged work because it's the most powerful crawler on the market. It's the fastest, too, with 8 speeds forward and 8 reverse. And International's exclusive Planet Power Steering gives pivot turns, feathered turns, turns with power on both tracks—better maneuverability to do a better job, to move more dirt per day.

Get the low-down from your International Industrial Distributor. You'll be a TD-24 man from then on in!

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

POWER THAT PAYS — INTERNATIONAL



DOWNTIME SLASHED. This mine's 26 bulldozers, working six strips simultaneously on a 3-shift schedule, kept losing efficiency because of poor lubrication. The problem was licked when the company switched to a heavy duty Sunvis Oil. This "Job Proved" product eliminated hard carbon, blow-by, and bearing failures, minimized crankcase dilution. Production increased, while costs went down.



SHUTDOWNS STOPPED. Thanks to a Sun Solnus Oil, this air compressor has been able to operate 24 hours a day for years without parts replacement or repairs of any kind. With the oil previously used, many bearings burned out; downtime was excessive. Crankcase temperatures were high, and oil consumption was far above normal.

SWITCH TO SUN PROVES WISE IN 4 MINES

BEARING FAILURES REDUCED. Some years ago, this mine adopted a Sun mine car grease to replace a high-priced special grease. The benefits have been twofold: a 25 percent decrease in bearing seat failures and a 40 percent decrease in lubrication costs.





SOARING COSTS DROP. When the operator of this coal mine found that his profits were being whittled down by high lubrication costs, he tried out a Sun grease on his mine cars. Finding it the most satisfactory product he had ever used, he adopted other Sun oils and greases for his locomotives. Today this mine is 100 percent Sun-lubricated and is enjoying the best results, at the lowest cost, that it has ever known.

For complete information on Sun Mine Lubricants, or for the services of a representative, call the nearest Sun Office, or write to Department CA-1.

SUN INDUSTRIAL PRODUCTS

SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

SUNOCO®

NEWS Round-Up

Industry Line Proposed to Ship Coal As Europe's Coal Crisis Shocks ECA

A JOINT PROPOSAL by bituminous operators and the UMWA to set up an industry-union shipping firm to export coal to all parts of the world has been put before the government, John L. Lewis reported Dec. 19.

The plan provides for leasing of inactive Liberty ships and their operation without profit to haul coal to Europe and Japan at costs which presumably would be lower than those now in effect. It would put American mines in the foreign markets permanently and just not for the emergency, Mr. Lewis emphasized. He asserted that present shipping costs were too high and that some European countries, using U.S. dollars, were buying coal from Communist-dominated countries at prices that were lower than those for coal shipped from the U.S. Use of the inactive ships would save the American taxpayer money, he maintained. While he did not say so, the ships presumably would be leased at a nominal cost.

Dependence of Western European nations on coal imported from the United States is "shocking" and there is urgent need for policy changes at the highest government levels before Europe can be strong, Paul R. Porter, chief Economic Cooperation Administration official in Europe, said recently.

Mr. Porter's statement came close on the heels of conversations at the end of November between defense administration officials in Washington and three representatives of the American coal industry. Ray Salvati, president, Island Creek Coal Co.; George Love, president, Pittsburgh Consolidation Coal Co.; and John L. Lewis, president, UMWA, expressed the view that more coal should be sent to Europe and stressed the eagerness of coal operators and mineworkers in the United States to mine more coal for shipment abroad.

In their conversations with Defense Mobilizer C. E. Wilson and Economic Stabilizer Eric Johnston, the three spokesmen urged that Western Europe's quota of 30,000,000 tons of coal from the United States be doubled, or at least raised to a minimum of 50,000,000 tons. They argued that the present quota falls far short of what is needed to keep defense and civilian production at top efficiency. They also asked that the Maritime Commission make large cargo vessels available to the coal trade and move the fuel to Europe at low rates. They pointed out that coal selling for $6 per ton f o b American mines now cost from $24 to $28 laid down at British or Western European ports.

Mr. Porter said that failure of European nations to fill their own coal needs is "the one black mark of Europe's otherwise fine production record." Industrial output in Western Europe now is running about 40% ahead of 1938 but coal production is only about 93% of the prewar average. The result is a lag in European steel production—some 4,000,000 tons less than the 60,000,000-ton capacity—and a consequent drain on United States steel, which is in short supply at home.

Getting down to cases, Mr. Porter said that some countries, notably France, have done well but that France, like most of Europe, must look to the big coal-producing countries, Germany and Great Britain, for substantial imports. The big producers have fallen down in their responsibility, he said.

Meanwhile, it was reported that the UMWA was scanning the possibility of buying cargo vessels for overseas coal movements. Union officials were reported to believe that the ships would pay for themselves within a short time while providing additional work for United States miners.

However, it appeared that a shortage of vessels was not the only obstacle to bigger coal exports. Bituminous exporters revealed that loading piers at East Coast and Gulf ports were jammed at the end of November. They feared they would not reach their 4,000,000-ton goal for that month. The combination of jammed loading piers and insufficient cargo capacity might clamp a ceiling on exports, they said.

An indication that there may be some let up in the European coal crisis by late this spring was reported from Geneva Dec. 18. While coal experts of the United National Economic Commission will not complete their estimates of coal requirements for the second quarter until February, it now appears likely that the coal deficit for that quarter will be reduced as compared with the first quarter, in which some 10 million tons of U. S. coal will be needed, it was said. Current recovery of coal stocks in many countries and some increases in output may ease the crisis somewhat by mid-year if there are no big strikes, reports indicated.

Power to Terminate Contract Given to UMWA Officers

At a meeting of the UMWA Policy Committee in Washington Dec. 18, the officers of the International Union were given discretionary power to give notice of termination of the existing wage agreements in the anthracite and bituminous industries when in their judgment such action is deemed advisable, John L. Lewis told a press conference Dec. 19. He said that the Committee's decision followed consideration of the 1952 problem of renegotiation of all contracts and was made with due regard to all factors of employment and future economy.

Mr. Lewis also said that the Committee "unanimously expressed sympathy with the steel workers" in their fight for higher wages and that the UMWA would help the steel union if needed and wanted.

Featured in This Section

Personal Notes	p 138
News Briefs and Trends	p 141
Kentucky Mining Institute	p 144
Association Activities	p 147
Obituaries	p 147
New Mine Developments	p 150
New Preparation Facilities	p 152
New Books for Coal Men	p 158
Among the Manufacturers	p 162

Australian Government To De-Socialize Mines

The Australian federal government has decided to go ahead with a complete de-socialization of the Australian coal industry and as its first step will soon begin to sell to private coal owners the machinery and equipment belonging to the Joint Coal Board, it was reported last month. Estimated at some $70 million, the equipment has up to now been owned by the Coal Board and made available on loan to private operators.

Under the program, the burden of maintenance and economical use of the machinery would rest with the mining companies, but the government will assist in securing financing for their future purchases of mining equipment. At the same time, it was also announced that the government will buy $12 million worth of open-pit coal-mining machinery from the U.S. A group of technicians from the Joint Coal Board is visiting the U.S. in an effort to speed up delivery. As a part of its plans to speed coal output, the government also is offering mine operators taxation concessions and more liberal foreign exchange for purchase of equipment.

Pittsburgh Consol Plant to Make Chemicals From Coal

A large pilot plant for the partial conversion of coal, employing its newly developed low-temperature carbonization process, was contracted for Dec. 14 by the Research and Development Div. of Pittsburgh Consolidation Coal Co. The plant will be built at the company's research center at Library, Pa., under a contract awarded to the Chemical Plants Div. of Blaw Knox Co.

While the carbonization process itself has been proved by months-long operation of a smaller pilot plant, according to the company, operation of the new larger plant will provide answers to two major questions: (1) cost and design data for a commercial plant and (2) production of sufficient quantities of liquids to permit commercial evaluation of the many chemicals and special carbons obtained by the process. Actual construction of the plant will begin this spring and is expected to be completed during the third quarter.

When partially converted by its process, each ton of coal produces seven-tenths of a ton of high-Btu solid fuel called "char," about 37 to 40 gal of tar liquid and some gas, Pittsburgh Consol said. The char serves as a high-grade boiler fuel, and the liquid, when refined by processes developed by the company, yields low-boiling tar acids, creosotes or feed stock for making carbon black, and electrode carbons. The tar acids are used for as chemicals and as intermediates by the plastics industry.



New Artificial Respiration Method Adopted for Mines

An improved method of artificial respiration—known as the back-pressure arm-lift—has been adopted by the American Red Cross, the USBM, the armed services and other agencies and organizations, it was announced last month.

Used in Norway, Denmark and other European countries for many years, the method permits greater exchanges of air and can be administered without undue fatigue to the operator, research dating back before World War II indicates.

In announcing the new method, the Bureau emphasized that it does not completely replace the Schaefer and other methods of artificial respiration because there are occasions where the older methods might be necessary, depending on the injuries suffered by the victim.

The Red Cross is printing 3 million supplements on the new system for inclusion in its first aid and water-safety textbooks and free copies will be available through Red Cross Chapters. It will include the new method in its courses as soon as possible but the changeover is not expected to be completed immediately because of the size of the teaching program necessary.

HOW THE METHOD WORKS: The victim is placed face down in a prone position with arms overhead and bent at elbows, one hand on the other, and the head turned to one side so that the cheek rests on the hands. The rescuer (Photo 1 above), on one or both knees at the victim's head, places his hands on the victim's back, with thumbs just touching and the heels of the hands just below a line running between the victim's armpits. The rescuer (2) rocks forward slowly, elbows straight, until his arms are almost vertical — exerting steady pressure upon the back. Next (3), the rescuer rocks backward slowly and slides his hands to the victim's arms just above the elbows. Continuing to rock backward (4), he raises the arms until resistance and tension are felt at the victim's shoulders—then dropping the arms to complete a full cycle. The cycle is repeated 12 times a minute, with the expansion and compression phases being of equal length and the release periods of minimum duration.

When Minutes Count...

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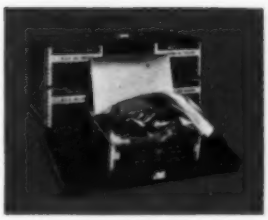


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Personal Notes





In New Posts at Truax-Traer and Union Pacific

FOLLOWING THE RESIGNATION of H. C. Livingston (right) to join Truax-Traer Coal Co. as vice president in charge of operations, Vernon O. Murray (left), formerly general manager, was promoted to vice president—operations, Union Pacific Coal Co., succeeding Mr. Livingston. Both changes were effective Jan. 1. Mr. Livingston had been associated with Union Pacific for 24 yr, joining the company in 1927 as a draftsman and general engineer. He held various engineering and operating posts and was named vice president — operations in 1946. Mr. Murray joined the company in 1930 as safety engineer and, after service as mine and general superintendent and assistant general manager, became general manager in 1946. John B. Hughes, who first worked for the company in 1913 as a miner, was advanced from general superintendent to general manager, to succeed Mr. Murray. Mr. Hughes was replaced as general superintendent by Charles Grosso, formerly district mine superintendent and a veteran of some 25 yr with the company.

Harry Williamson, for the past 15 yr chief electrician of the New Kathleen mine, Union Colliery Co., DuQuoin, Ill., has been named superintendent, succeeding A. G. Gossard, who resigned to join the Snow Hill Coal Co. as vice president and general manager. **Nathaniel Kirk**, safety director, has been appointed assistant superintendent, continuing to serve also as safety director. **Campbell Tyner**, formerly electrical foreman, has succeeded Mr. Williamson as chief electrician.

Harold L. Beattie, of Charleston, W. Va., has joined the Elk River Coal & Lumber Co., Widen, W. Va., as production engineer, with jurisdiction over mine planning and policy. A graduate of the University of Pittsburgh, Mr. Beattie was formerly associated with EG&FA Coal Div. as division superintendent and with Davis Coal & Coke Co. and Warner Collieries Co. as vice president of operations.

John D. Kelly, associated with the Peabody Coal Co. for many years, last month was named superintendent of the company's Majestic No. 14 mine, DuQuoin, Ill. Mr. Kelly, who previously was superintendent of the company's recently closed Mine No. 59 at Springfield, replaces **Robert Anderson**, who continues at No. 14 in a supervisory capacity. **Glenn Dodd**, formerly mine manager, Mine No. 47, Harco, has been transferred to Mine No. 14 in a similar capacity.

Charles Dorrance, who retired last spring as president of the West Virginia Coal & Coke Corp., has joined the management engineering and consulting firm of Stevenson, Jordan & Harrison, Inc., New York, as senior mining consultant.

J. P. Routh, chairman of the board of the Clinchfield Coal Corp., has been elected to the additional post of president, succeeding **A. R. Matthews. Robert H. Hughes**, chief engineer whose election as vice president was previously reported, is in charge of mining operations, with headquarters in Dante, Va. **H. W. Livingston**, formerly comptroller for the company, has been advanced to vice president. **O. N. Hall**, assistant comptroller, has been made comptroller, to replace Mr. Livingston.

Recent promotions at the Wharton No. 2 mine, EG&FA, Coal Div., include the following: **Charles Mynhier**, general mine foreman; **Frank Johnson, Roscoe Cook** and **Charles Riffe**, assistant general mine foremen; **Earl Buckley**, coal section foreman; and **Hobart Stephens**, rock foreman.

Henry F. Hebley, research consultant, and **Earl C. Payne**, consulting engineer, Pittsburgh Consolidation Coal Co., were elected fellows of the American Society of Mechanical Engineers at a recent meeting of the society's board of directors. The citation to Mr. Hebley honored him for his work in the fields of atmospheric and stream pollution, stating that his efforts had contributed most to the profession and "significantly to the public welfare." Mr. Payne was honored for his contributions to fuel performance and for his "outstanding engineering work" in organizing and directing group "programs on research and development to advance the art and profession of fuel engineering, including both technical and economic phases."

Dr. Arno C. Fieldner, chief fuels technologist of the USBM, recently received an honor award from the Washington (D.C.) Society of Engineers. Recognizing outstanding professional achievement, the award has been in existence for many years but has been presented only four times previously. Dr. Fieldner has been with the Bureau for more than 40 yr and is an internationally known inventor and developer of many techniques of testing and analyzing coal, coke and gas.

COMING MEETINGS

AIME: annual meeting, Feb. 18-21, Hotel Statler, New York.

Bituminous Coal Research, Inc.: annual meeting, Feb. 28, Edgewater Beach Hotel, Chicago.

American Society of Lubrication Engineers: 7th annual meeting and lubrication show, April 7-9, Hotel Statler, Cleveland.

Smoke Abatement Group Cites Steady Progress

Representatives of 500 coal mining companies in Kentucky, Ohio, Pennsylvania, Tennessee, Virginia and West Virginia and eight coal-hauling railroads who met in Cincinnati Dec. 4 were enthusiastic over the progress shown by the Coal Producers Committee for Smoke Abatement since its organization 10 yr ago.

Various speakers reported how the committee, which at its inception was regarded by some as merely an attempt to "whitewash" coal, is today consulted by practically every city in the Midwest and Eastern portions of the country which is sincerely engaged in the control of air pollution.

Ezra Van Horn, chairman of the executive committee which directs the activities of the Coal Producers Committee for Smoke Abatement said that the plan of action originally conceived by the committee, that of making sur-

Lincoln centralized lubrication systems

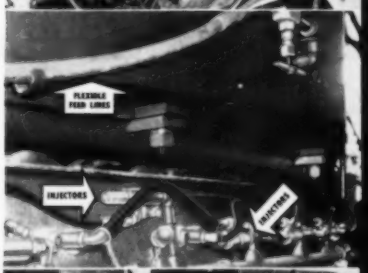
save $75,000 per year maintenance cost on stripping equipment for Hanna coal company

Div. of Pittsburgh Consolidated Coal Co.



Lincoln Centralized Lubrication Systems automatically lubricate over 200 bearing points on each of these 50 cubic yard Marion Shovels without shutting them down. The right Lubricant is supplied to each bearing in the right quantity, at the right time.







The Lincoln Centro-Matic* System employed on the two Marion 50 cubic yard shovels at Hanna Coal Company's Georgetown No. 12 Property consists of an air-motor operated pump, electric time-clock controlled, with a 24 hour recorder, dispensing lubricant from an original 400 lb. refinery drum through a single supply line to Injectors, one for each bearing, connected by flexible or rigid tubing to the bearings. The System on each shovel automatically serves over 200 bearings while the machine is operating.

The supply of lubricant is tailored to the requirements of each bearing by adjusting the Injectors to deliver the exact quantity required. With the old system of hand lubrication, bearings were frequently damaged by over-lubricating them at the beginning of the shift and then starving them until the shovel was finally stopped for a new round. In addition to the hazards involved, a large quantity of lubricant was wasted.

1. All bearings on the dipper-stick swivel and knuckle assembly are lubricated simultaneously, through a circuit of 31 Injectors. Lubrication of these bearings by hand methods formerly required stopping the machine 15 minutes each shift while the oiler climbed the boom in all kinds of weather with a grease gun. This hazard has been eliminated, along with the 45 minutes production previously lost each day.

2. Centro-Matic* System automatically lubricates 98 circle-roller bearings in 4 to 5 minutes each 8 hour shift. Previously, the work was done by an oiler with a small hand grease gun while the machine was rotating, normally requiring 2 hours per 8 hour shift.

3. Duplicate pumps are provided as insurance against pressure failure. In addition to acting as a stand-by, one pump is also used to fill hand guns direct from the original refinery container to prevent contamination of lubricant.

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veys of individual offenders and preparing recommendations for correcting nuisances, has been so effective that his committee had voted unanimously to continue the present mode of operation without change. During the last 10 yr, Mr. Van Horn said, the committee has given service to 200 cities and is the repository of more factual data on the subject of air purification than any other organization in the country.

H. B. Lammers, present chairman of the committee, told the group that there is definitely a better understanding today of the complex problems involved in air purification, although no one who has made a study of these problems would assume that all of them had been solved even on paper. He paid high tribute to the coal operators and the railroads who organized the committee 10 yr ago, for their foresight in recognizing the importance of smoke control in the use of their products.

Mr. Lammers said that already 40 cities have adopted the ordinances and recommendations proposed by the committee and 85 more have either adopted a substantial part of the recommendations or now have them under consideration. "The main reason the program of the committee is meeting with almost universal acceptance is because it is a practical, common sense approach to the problem," Mr. Lammers said.

News Briefs and Trends

Coal Pipeline Now Working

The demonstration-size coal pipeline for transporting a slurry of fine coal and water was completed and went into operation in November at the Georgetown mine, Hanna Coal Div., near Cadiz, Ohio. The Research & Development Div., Pittsburgh Consolidation Coal Co., reported that the pipeline simulates a commercial operation in equipment and terrain. About 7,000 to 9,000 tpd moves through the line. The line is made of 12¾-in pipe. The pipeline will run for about a year while engineers gather and evaluate data. After that, company officials will decide whether to build a commercial-size line.

Long-Service Men Honored

Out of 234 mine employees who have been with the company or predecessor companies from 20 to 50 yr, one has completed 50 yr of service, 10 have 40 yr, 22 have 30 yr, 82 have 25 yr, and 110 have 20 yr, according to an announcement by D. C. Stewart, manager of industrial relations, Eastern Gas & Fuel Associates. Mineworkers on the 234-man list total 211, including the one 50-yr veteran and 39 of the 40-yr men. Twenty-three are officials or office workers. The company will present jeweled pins or buttons to the entire group in ceremonies soon to be staged in districts where the company has mines.

Coal Men Hit State Tax Plan

Coal-industry representatives early in December struck hard at a proposed tax on the extracted value of minerals mined or quarried in Virginia. The levy, proposed by W. N. McGill, head of the State Geological Survey, would amount to 2 mills per dollar of the sale price of the mineral. Income would be earmarked for expansion of the activities of the geological staff. Coal men expressed their views at a hearing before a special commission studying taxation of natural resources in Virginia. Industry spokesmen opposing the plan included: J. L. Camblos, Big Stone Gap; R. C. Hamblin, Stonega Coke & Coal Co.; G. H. Esser, Virginia Coal Operators Association; and H. M. Livingston, Clinchfield Coal Corp.

Bosses Not Under Labor Act

Section foremen exercise managerial functions and discretionary power, are exempt from the Fair Labor Standards Act and therefore may not collect a claim for overtime pay, according to a ruling by the U. S. Fourth Circuit Court of Appeals. The court declared that a guarantee of three shifts per week to foremen was a "salary" basis and that their performance of manual work during a strike was done in an executive capacity and did not deprive them of their exempt status. The decision grew out of a claim filed in behalf of section foremen employed by the Pocahontas Corp.

COAL AGE was founded in 1911 by the Hill Publishing Co. In 1915 COLLIERY ENGINEER, with which MINES AND MINERALS previously had been consolidated, was absorbed by COAL AGE.

When, in 1917, the Hill Publishing Co. and the McGraw Publishing Co. were consolidated to form the present McGraw-Hill Publishing Co., Inc., COAL AGE became a member of this larger publishing enterprise. On July 1, 1927, the journal was changed from a weekly to a monthly.

During 41 years the editorship has been held successively by Floyd W. Parsons, R. Dawson Hall, C. E. Lesher, John M. Carmody, Sydney A. Hale and Ivan A. Given. The editorial staff of COAL AGE presently consists of: Ivan A. Given, J. H. Edwards, William H. McNeal, W. A. Stanbury Jr. and Harold Davis.

Buck Rogers Department . . . Bomb Puts Out Fires; Dope Makes Clay Burn

If inventors' dreams come true, coal-mine explosions may be quenched by bombs and fuel customers may turn from coal to clay.

A carbon tetrachloride bomb invented by Britishers to keep airplanes from blowing up in combat soon may be adapted to prevent dust and gas explosions in coal mines. The bomb is about half the size of a grapefruit, reports say. Within a few thousandths of a second after an explosion starts, the bomb bursts and releases a gas that completely dampens the explosion.

On this side of the Atlantic, in Alton, Ill., the Holmanite Fuel Corp. says it has a new chemical process for making good fuel out of lignite, peat, coal-mine sludge, low-grade coal and even clay. Henry Holman, chemist and inventor, declines to reveal details beyond saying that the process involves adding special chemicals, rather than heat, to remove moisture and improve heating quality. From 500 to 600 lb of the chemical concentrate is used to "soup up" a ton of lignite. Mr. Holman claims the process can doctor low-grade fuels in Great Britain and Europe much cheaper than American coal can be shipped to those countries.

Railroads Ask Rate Boost As They Add Diesels

Railroads have sought and the Interstate Commerce Commission has granted a reopening of the freight-rate hearings of last spring. At that time, the roads were given a general increase of 6 to 9% in various regions with a maximum of 6% on coal. They had asked for 15% across the board. The new hearings, for which no date has been set, will consider the railroads' original petition for a 15% hike. The roads contend that wage increases and rising costs of materials make the boost necessary.

Meanwhile, the Chesapeake & Ohio Ry., the Nation's biggest coal carrier, has sped its switchover to diesels. The road recently ordered 149 diesels for delivery in the first half of 1952 at a cost of $22,000,000. Most of the new units will be placed in freight service. At the end of 1951 it was reported that C.&O. passenger operations were nearly 100% dieselized. The Pennsylvania R.R. also placed an order in December for 180 new diesels at a cost of $30,203,000, and 5,000 new freight cars, 3,600 of which will be gondolas.

Company Sues UMWA

A Federal District Court has refused to dismiss a $750,000 damage suit filed against the UMWA by the Blackwood Fuel Co., Blackwood, Va. The court ruled Dec. 7 that the union's claim that the no-strike clause was abolished in 1950 was invalid. When

union lawyers objected to the ruling, they were given 40 days to answer and make additional pleas. The Blackwood firm is asking payment for damages alleged to have resulted from stoppages and strikes since last September. The company contends that the shutdowns violated its contract with the union.

NLRB Hits UMWA in Ky. Case

The UMWA has no right to insist that Consolidation Coal Co. (Ky.) rehire laid-off union members at Mine 214 instead of transferring 57 other employees from Mine 207 (*Coal Age*, October, 1951, p. 129), a National Labor Relations Board trial examiner has ruled. The examiner found that the union tried by threats and coercion to prevent employees at Mine 207, which is approaching exhaustion, from transferring to the more productive mine.

1951 Bituminous Output Up; Anthracite Slips

Bituminous production will total about 535,000,000 tons in 1951, the Bituminous Coal Institute said in its year-end review released Dec. 14. The output will be almost 19,000,000 tons above the final 1950 figure of 516,311,053 tons recently reported by the USBM. Anthracite mined in 1951 was estimated at 39,463,000 tons, or 6.7% below 1950, according to the Anthracite's Institute's report issued Dec. 18. "Anthracite production has held up firmly despite the adverse effect of three unprecedently mild winters in a row . . . If normally cold weather prevails for the remainder of the winter, production by the end of the coal year in the spring will easily exceed 1950," Frank W. Earnest Jr., president of the institute said.

New-Type Pressed-Coal Blocks Provide Improved Home Fuel

Successful development of an improved fuel consisting of coal dust pressed into a block with a binder of sulphite liquor was announced Dec. 20 by the Sulphate Pulp Manufacturers' Research League. Production has been begun by the F. Hurlburt Co., Green Bay, Wis., whose operations include concrete-block fabrication and a coal dock. The sulphite liquor, which is concentrated to contain 60% wood solids, provides an excellent binder for coal dust created in its dock operations, it was said. The coal company reports that the fuel can be made to sell for less than larger coal of the same quality.

British Coal Experts Laud U. S. Labor and Management

"We should like to see injected into the British industry the sense of adventurous urgency which characterizes the American attitude toward development and is found in management and men alike," a team of British coal experts said Dec. 18 in reporting on their 1951 tour of U. S. mines. British productivity could be increased by the adoption of several American methods, but it is largely a question of attitude on the part of both labor and management, the report stated. In the U. S., mining efficiency is based on the belief shared by both sides that each gains by increasing productivity at a lower cost, and on the clear recognition by both of their respective roles, it pointed out. The report was published by the Anglo-American Council of Productivity.

Operators Now "Good Boys"

Coal operators "are very good at the present time, but that's no guarantee that they are going to continue that way," Thomas Kennedy, UMWA vice president, told a group of French trade union leaders this fall. "We find that whatever we get we have to get it through our economic power. But the operators are all right now . . . They're making plenty of money and they're friendly. And we hope it will continue that way.

International Meet Set on Underground Gasification

The U. S. will play host late this month to the first International Conference on Underground Gasification of Coal under the joint sponsorship of the USBM and the Alabama Power Co. The meeting will be held Jan. 28-30 in Birmingham and Gorgas, Ala., under the co-chairmanship of Dr. W. C. Schroeder, assistant director of the Bureau, and Dr. M. H. Fies, Bureau consultant and manager of coal operations for Alabama Power. Leading European scientists and American experts will discuss experiments abroad and in the U. S. and presentation of papers will be followed by an inspection of the Gorgas project. Afterwards, the foreign representatives will tour various USBM stations and attend a symposium on coal gasification and hydrogenation at the 1952 annual meeting of the AIME in New York.

Power Meeting Changes Name

The Midwest Power Conference has been renamed the American Power Conference "to more accurately describe the scope and character of the conference," it was announced Dec. 17 by R. A. Budenholzer, conference director and professor of mechanical engineering at Illinois Institute of Technology. The 13 annual Midwest Power meetings have attained wide geographical and scientific significance, he emphasized. The first annual American Power Conference will be held March 26-27 at the Sherman Hotel, Chicago, with Illinois Tech, as in the past, sponsoring the meeting and the same groups participating.

Fund Default Closes Mines

Some 26 small mines in Northern West Virginia have been closed because their operators were delinquent in making payments to the UMWA Welfare and Retirement Fund, Cecil J. Urbaniak, president of District 31, reported Dec. 13. The delinquency represents a "breach of contract" and the district has instructed the locals to cease operations until the royalties have been paid in full, he said. About 20 of the mines are in Preston and Monongalia Counties.

UMWA Drive Brings Violence In Central Pennsylvania

The UMWA organizing drive in the non-union coal fields of Central Pennsylvania last month again brought violence, as dynamiting of a tipple of the Elder Coal Co., near Hastings, Pa., caused damage estimated at $10,000. Elsewhere in District 2, the UMWA and its agents have been ordered by the NLRB to stop restraining and coercing employees of three coal companies, the Ziros Co., the Mercury Mining & Construction Corp. and the Pine Hill Coal Co. Three coal companies operating in Blair and Clearfield Counties last month petitioned a federal court to return jurisdiction to the county courts in the injunction action against picketing previously issued by the courts. The UMWA had previously succeeded in having the action transferred. Companies involved were the Bradford Coal Co., Cavalier Coal Co. and Butler Coal Co. Currently, the UMWA was seeking transfer to federal court of injunction actions involving Stripping Contractors, Inc., and the Waroquier Coal Co.

Bituminous Coal Institute has begun distribution of the *1951 Bituminous Coal Annual*. The new volume, containing 204 pages, follows the general pattern of its predecessors, with up-dated tables, new photos and graphics and a rewritten text.

A grant of $6,500 for the study of strip-mined areas has been made by the Illinois Coal Strippers Association to the Department of Mining & Metallurgical Engineering, University of Illinois.

Christmas turkeys again were given to 340 miners of the New Kathleen Mine, Union Colliery Co., DuQuoin, Ill., in recognition of their safety record. The turkey-for-safety award was started 3 yr ago. Since then, the mine has had no fatalities.

An anthracite miner late in November filed suit to compel payment of a $100-a-month pension by the Anthracite Heath & Welfare Fund. Vincent Forrest, the plaintiff, claims that he has met all conditions laid down by fund administrators but that the fund has refused to enroll him on its pension list.



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OUTSTANDING FOR DEPENDABILITY

You get ***all-round dependability*** in a Chance coal-cleaning unit. Cone and auxiliaries are built to stand up long and strong in hard, continuous service . . . with minimum down time, with low cost maintenance. Operation is simple, sure, always under complete control. Specific gravity of mixture remains constant and is unaffected by fluctuations in tonnage or composition of coal. In addition, the Chance Process gives you:

High Separating Efficiency—close to 100% recovery of salable coal. Also, from a single Chance Process unit you can obtain a low ash product, medium ash product, and a reject product.

High Degree of Flexibility—ability to handle coal at operating gravities from 1.35 to 1.65 with size range as wide as 10" x ⅛" to one washing unit.

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WITH A BACKGROUND OF OVER SIXTY YEARS' EXPERIENCE



OPENING SESSION—Seated: H. M. Gallaher (left) and F. P. Kerr, respectively retiring and newly elected presidents. Standing: A. D. Sisk (left), R. L. Talbert, David A. Zegeer, Foster Apple and Dave Young.

A special Coal Age staff-written report on the 12th annual meet of the . . .

Kentucky Mining Institute

Latest practice on electrical controls and safety standards for underground belts, drilling gas wells through coal, prevention of electrical mine fires, new-type man-trip cars, and what the coal consumer wants feature Lexington meeting

HIGHLIGHTING the 12th annual meeting of the Kentucky Mining Institute at Lexington, Nov. 15-16, were technical sessions dealing with safe electrical controls for belts, insurance rates, gas wells through coal seams, electrical protection, mining contiguous seams, reducing water pollution and consumer buying of coal. F. P. Kerr, general manager, Eastern Coal Corp., Stone, Ky., was elected president of the Institute. After the close of the last session a considerable number of those in attendance journeyed to the University of Kentucky campus to witness laying of the corner stone and dedication of Unit No. 1 of the Mineral Industries Bldg.

H. M. Gallaher, superintendent, Harvey Coal Corp., Harveyton, and outgoing president, conducted the institute meeting, assisted by Mr. Kerr as chairman of the technical sessions. At a luncheon meeting, with George E. Evans Jr., owner and general manager, Evans Elkhorn Coal Co., Lackey, as toastmaster, the speaker was Paul



ELECTRICAL PROBLEMS, man-cars for low coal and contiguous-seam mining—F. J. Forsyth (left), A. H. Jopp, I. C. Spotte and C. T. Holland.



REDUCING WATER POLLUTION and what the consumer seeks when he buys coal—C. H. Hodgson (left), Ernest M. Spokes and Carroll Hardy.





SPEAKERS AT DEDICATION of Unit No. 1 of the Mineral Industries Bldg. includes S. M. Cassidy (left), with C. S. Crouse and A. D. Sisk standing by. Various prominent coal men were on the "speakers platform" (right).

W. Bryant, head coach, University of Kentucky. At the annual dinner, W. J. German, consulting engineer, Huntington, W. Va., was master of ceremonies. Co-chairmen of the program committee for the institute meeting were C. H. Hodgson, district manager, Mine Safety Appliances Co., Hazard, and R. L. Smith, MSA district manager, Harlan.

Among the speakers at the building dedication were C. S. Crouse, head, Department of Mining & Metallurgical Engineering, University of Kentucky; S. M. Cassidy, president, Consolidation Coal Co. (Ky.); and A. D. Sisk, chief, Kentucky Department of Mines and Minerals. Mr. Sisk's department will move into the new building within a few weeks and the Kentucky Geological Survey will occupy the upper floor.

Committee reports at the institute meeting included those on education and on the publication of a mining text or reference book written on the high school level. Reporting on the latter, J. H. Mosgrove, safety director, Big Sandy-Elkhorn Coal Operators' Association, said that the well-illustrated book of about 400 pages is now in the hands of the printer. On education, Mr. Cassidy, chairman, reported that the committee has decided on the following objectives: (1) work closely with the university, coordinating with the College of Engineering; (2) develop a useful and forceful program for high schools and vocational schools; (3) encourage use of the university extension courses; and (4) develop a publicity program to acquaint the public with the coal industry.

Mr. Sisk, reporting on fires and explosions in Kentucky for the past year up to Nov. 15, said that there had been eight fires and one explosion. No one was killed in the fires, but one man was killed in the explosion, which was touched off by use of a welding torch in a dusty place in a headhouse. Four of the fires were of electrical origin and four were from unknown causes. One was a serious fire in which 1,000 ft of belt was destroyed.

Electrical Belt Controls

R. L. Talbert, safety director, Wisconsin Steel Co., Benham, presented a paper, "A Safe Electrical Control For Underground Belts," which described the control methods in No. 2 mine, using panel belts to carry coal from shaker conveyors to drop-bottom mine cars. The roof consists of 12 to 60 in of drawslate. Rooms are driven 220 to 250 ft deep and pillars are withdrawn completely. Control is based on a time-delay unit, the usual starter and safety switch, a centrifugal switch operating from a return idler, and on interlocking controls with the conveyors discharging to the belt.

The control cable handling the sequence control has three No. 14 conductors. One of them is part of a loop circuit from belt drive to tail piece and back, with hand switches in series at 250-ft intervals and at the shaker-discharge points. Red and white lights at these switches tell at a glance if a switch is open (red) or closed (white).

The necessity of proper installation and maintenance procedures with an interlocking control plan to guard against temporary or faulty wiring was emphasized by Mr. Talbert. The mechanic on the section is charged with the responsibility of checking to keep the equipment and controls up to par.

Kentucky Institute Officers

President—F. P. Kerr, general manager, Eastern Coal Corp.

Vice Presidents—L. P. Johnson, vice president, Crummies Creek Coal Co., Harlan; S. M. Cassidy, president, Consolidated Coal Co. (Ky.); and S. A. Fox, general manager of southern mines, Blue Diamond Coal Co.

Directors—J. T. Parker, superintendent, Inland Steel Co.; V. D. Picklesimer, general superintendent, South-East Coal Co.; J. W. Atkins, vice president, Perkins-Harlan Coal Co.; J. P. Upchurch, superintendent, Atlas Coal Co.; O. W. Evans, general superintendent and purchasing agent, Mining Dept., Norfolk & Western Ry. Co.; Fred A. Stewart; S. J. Dickinson, general manager, Mary Helen Coal Corp.; Bradley Sparks, general manager, Duncan Coal Co.; Thomas Hamill, assistant superintendent, Sycamore Coal Co.; C. J. Barton, general superintendent, Kentucky Ridge Coal Co.; G. M. Patterson, chief engineer and operating manager, West Kentucky Coal Co.; and F. Smith, Blue Diamond Coal Co.

Secretary-Treasurer—A. D. Sisk, chief, Kentucky Department of Mines & Minerals.

Belt Safety Underground

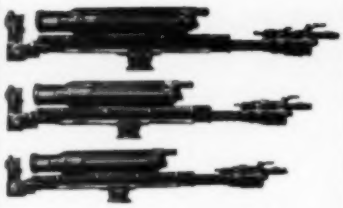
David A. Zegeer, assistant superintendent, Hendrix mine, Consolidation Coal Co. (Ky), in a paper, "Safety Standards For Underground Belts In Coal Mines," covered the phases of ventilation, cleanliness, timbering, man-trips, power lines, fire fighting and installation. Adherence to proper standards means continuous operation and lower cost for any operator and includes safety of the men underground, he emphasized.

The belt should be on a separate ventilation split, with self-closing trap doors on the return side of the belt entry at approximate 150-ft intervals and the innermost door slightly open to complete the air split. Timbering should be adequate and posts should clear the belt frame 6 in on the tight side and 30 in on the clearance side. Cross-over platforms at belt level are a safety precaution and save

(*Continued on p. 173*)



★ Air-feed sinkers — 2-way feed, 2 sizes. They take the back-breaking work out of drilling horizontal holes, lighten the load on your miners, and increase tonnages.



★ Power-feed and hand-cranked drifters. Dependable, powerful, and fast. Ideal for columns and jumbos alike.



★ A complete line of sinkers from 18 to 80 lbs. including the popular 45-lb. H10, and 55-lb. H111.

It's Le Roi-CLEVELAND for Drills You Can Count On

. . . . . fast-drilling, dependable favorites of mining men since 1906

Of course, you know that Le Roi-CLEVELAND builds the popular, easy-holding H10 and H111 sinkers... the fast-drilling PD24, 25, and 14 power feed drifters . . . the S11 and S822 stopers with trip rotation for easier handling . . . and a mine jumbo that lets you drill out your rounds faster, with greater safety.

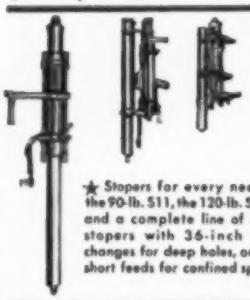
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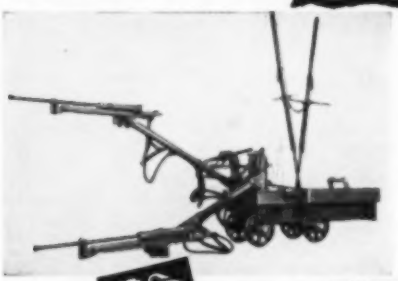
Detailed information about the complete Le Roi-CLEVELAND rock drill line is yours for the asking. Just write us.



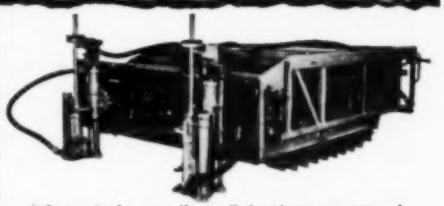
★ The SDR 34 shaft sinker for faster shaft sinking. Fully closed it's 5'6" between drill centers; open 19'3". All adjustments quickly made with air motor.



★ Stopers for every need — the 90-lb. S11, the 120-lb. S5-22, and a complete line of offset stopers with 36-inch steel changes for deep holes, or with short feeds for confined spaces.



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★ Stoper jumbo — self-propelled with its own integral dust-collection system for positive dust control, the latest thing for roof bolting.

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Association Activities

Hazard Coal Operators' Association, at its 36th annual meeting in Lexington, Ky., Nov. 23, elected the following officers: president, C. P. Gum, general manager, Wisconsin Coal Co.; vice president, M. K. Elben, president, Elben Coal Co., and mayor of Hazard, Ky.; and secretary-treasurer, William B. Sturgill.

Appalachian Coals, Inc., has elected W. W. Goldsmith, receiver of the Elk Horn Coal Corp., a member of its board of directors.

Pocahontas Electrical and Mechanical Institute, at its annual meeting recently, elected new officers as follows: president, H. B. Smith; vice presidents, H. E. Mauck and John Schroder; secretary, S. S. Cooper; assistant secretary, J. B. Wooldridge Jr.; and treasurer, B. B. Housman.

Pennsylvania State Bituminous Mine Inspectors' Advisory Association, at its annual meeting in Pittsburgh Dec. 11, elected as president, Clyde H. Maize, of Somerset, inspector for the 20th Bituminous District, succeeding Olin S. E. Conrad, Monongahela. W. Roy Cunningham, inspector for the 7th Bituminous District, was re-elected secretary for the third consecutive term.

Bituminous Coal Research, Inc., has announced the addition of Henry H. Russell as a development engineer on its Pittsburgh staff. Mr. Russell, a chemistry graduate of Penn State College with 17 yr of industrial experience, will be primarily concerned with improving coal utilization. He formerly was a process engineer with the Chemical Plants Div. of Blaw Knox Construction Co.

Obituaries

Herbert E. Bell, 84, founder of the Bell & Zoller Coal & Mining Co. and The Cardox Corp., Chicago, died Nov. 22 at his home in Pasadena, Calif., following a prolonged illness. A pioneer of some 64 yr in the coal industry, Mr. Bell played a major role in the development and expansion of coal mining in Illinois and nearby states and was widely known throughout the country. In 1887, he joined the coal wholesaling firm of Richard, Pease & Co., and after several partnerships joined with the late Walter E. Zoller to form Bell & Zoller in 1896. The company began its acquisition of operating mines in 1906. Following Mr. Zoller's retirement in 1927, Mr. Bell continued to head the organization. In 1929, he founded the Cardox Corp. to develop and promote the possibilities of a non-explosive coal-breaking force. He served as president and chairman of the board of both organizations, retiring from all his various business activities in 1950.

Dwight D. Wilcox, 65, until his retirement 3 yr ago general superintendent of the Superior Coal Co., Gillespie, Ill., died Nov. 30 at his home in Gillespie. A past president of the Illinois Mining Institute, Mr. Wilcox went to work as fireman at Superior No. 1 mine in 1904. From 1915 on he held various official positions, becoming assistant to the general superintendent in 1920 and general superintendent in 1926, the post he held at his retirement.

R. A. Bartlett, 63, superintendent, Sahara No. 16 Mine, Sahara Coal Co., Harrisburg, Ill., died Nov. 26 after a short illness. Mr. Bartlett had been associated with Sahara for some 35 yr and before being transferred to No. 16 was mine manager of No. 10 mine when it was closed.

John S. O'Neil, 83, retired coal mine owner and developer in Pennsylvania, West Virginia and Ohio, died Dec. 10 at his home in Cleveland. Mr. O'Neil began operating mines as a young man, later developing properties for various large firms. Before his retirement he also was associated with the Warner Collieries Co. and the Uniontown Coal Co.

L. Wilson Fields, 74, Whitesburg, Ky., president of the Line Fork Cannel Co., died Dec. 2 at Cross City, Fla., following a sudden heart attack while enroute to Tampa.

Thomas David Crook, 70, owner of the Crook Coal Co., Danville, Ky., until his retirement, died Nov. 27 at his home in Gray, Ky.

COAL MEN ON THE JOB



EASTERN GAS & FUEL ASSOCIATES, POWELLTON (W. VA.) NO. 6 MINE: Supervisors attending a luncheon held last year to honor five foremen with top safety and efficiency ratings included: FRONT ROW—E. W. Potter (left), superintendent; W. W. Hunter, general superintendent; C. B. Steele, resident engineer; P. P. Reece, plant inspector; L. M. Douglas, general foreman, Island mine; James Scarbro, coal inspector; E. L. Whitt, general foreman; A. E. Grounds, William A. Rhodes and William L. Black, assistant general foremen; Fred G. Phelps, chief electrician; and A. S. Ashley, mine accountant.

SECOND ROW—Anthony Black (left) and Charles Huddleston, section foremen; Bert Hess, tipple foreman; Ed Buchanan, dispatcher; A. P. Gilliam, section foreman; W. A. Rowland, general inspector; G. E. Christian, Earl Adkins and James Tully, section foremen; Robert Mayes, mechanical loader foreman; Allie Sheppard, dispatcher; Edgar Griffith, Robert Bowen and John Jeffrey, section foremen.

THIRD ROW—Rev. T. E. Rutledge, Jr.; Jack Koch, mine examiner; L. R. Coleman, carpenter foreman; Dart McKinney, Charles Johnson and Henry Crisp, section foremen; Murl Adkins, dispatcher; and H. Kinder Jr., section foreman.

FOURTH ROW—W. T. Webb (left) and E. D. Neibert, section foremen; Clycie Null, dispatcher; and Howard Ritz, section foreman.

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Open braid firmly interlocks conductor to tough, all-resistant Neoprene sheath . . . prevents loosening and sheath separation from twisting, bending and pulling.

Grounding conductor is solidly embedded in Neoprene. This integrated construction provides exceptional protection against "shorts" and mechanical injury . . . maintains flexibility and reduces conductor distortion and fatigue.

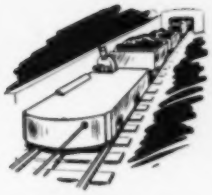
Rome 60 Line Includes: Type SO Portable Cords • Single Conductor Locomotive Cables • Concentric Mining Machine Cables • Twin (Parallel Duplex) Mining Machine Cables—Types W and G • Multiple Conductor Portable Power Cables—Types W and G • Shot Firing Cord • Mine Power Distribution Cable • Shovel and Dredge Cables

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Did you ever stop to figure the cost of mining cable failure? . . . the cost in tonnage losses, in man hours wasted, in expensive equipment standing idle? *It's always many times the cost of the cable itself.* That's why we say "It Costs Less To Buy the Best" . . . Rome 60 Mining Cables.





Single Conductor Locomotive Gathering Cable

Here's the ideal locomotive cable. It offers small diameter and exceptional flexibility. An open braid firmly interlocks the heat resistant insulation to the rugged Neoprene sheath. Strong adhesion between the conductor and insulation is also provided. All combine to assure you of safe, continuous operation and long service life.

Manufactured in full conformity to State of Pennsylvania and Bureau of Mines Safety Codes, Rome 60 Locomotive Cables are marked P-105 BM.



INTERLOCKED CONSTRUCTION—Take a good look at the Parallel Duplex Shuttle Car Cable, illustrated at the left. Note how the open braid around each conductor firmly interlocks . . . actually "gears" it to the Neoprene sheath. This prevents failure from twisting, pulling, and sheath separation. As an extra feature, the heat-resistant rubber insulation offers exceptional overload protection—is suitable for operation at 75° C.



MAXIMUM FLEXIBILITY—Now, see how the grounding conductor is separated from the insulated conductors by a tough, highly resilient Neoprene webbing. Result? . . . Maximum flexibility, high resistance to impact, less conductor fatigue, as well as increased protection against "shorts." There are no fibrous "separators" to rot, deteriorate or wick moisture.



ALL-RESISTANT NEOPRENE SHEATH—And now a glance at the Neoprene sheath . . . Molded in lead to a tire-like toughness, it is highly resistant to acids, oils, abrasion and flame. P-105 BM molded in the Neoprene sheath is your assurance of compliance with Federal and Pennsylvania Safety Codes. Depend on Rome 60 Mining Cables to keep the power flowing in—and the coal flowing out.

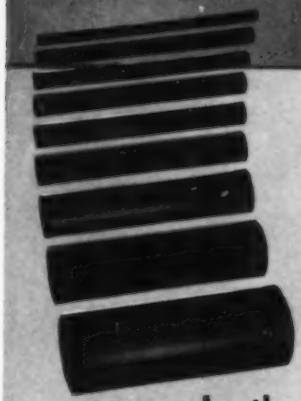
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PLASTIC PIPE
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WORST ACID CONDITIONS

Actual mine installations of Johnsonite Plastic Pipe prove its resistance to corrosion is many times greater than ordinary pipe.
Also, installation costs are lower because it handles so easily and the number of couplings have been reduced.

500 feet in the ½" size weighs only 50 lbs.

It finds its own floor—just lay it down

It's so flexible it can be tied in a knot

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Johnsonite is tough. It lasts over 30 years.
Write for our new catalog, or see your nearest distributor.

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New Mine Developments

Minerals Development Corp., Salt Lake City, has taken over the coal properties of the Kaiser Steel Corp. in Delta and Gunnison Counties, Colorado, including 3,700 acres of coal land and two operating mines, Oliver and Somerset, and planned to immediately re-open the mines, closed since Nov. 15, it was announced last month. President of the recently formed company is Claude P. Heiner, former president, Utah Fuel Co. and Calumet Fuel Co. General manager is R. C. Oliver, former president, Oliver Coal Co., and general manager, Utah Fuel. No major changes in mine personnel are contemplated. Minerals Development Corp. is a subsidiary of Godfrey L. Cabot, Inc., of Boston, a large chemical firm which reportedly is one of the largest producers of carbon black in the U. S. Entry of the two firms into the coal business in that region is believed to be a step eventually leading to the development of important new carbonization processes, it was reported.

Purchase of four mines in Southern Illinois by the Woosley Equipment & Salvage Co., Belleville, Ill., and John A. Becker of the Collinsville (Ill.) Ice & Fuel Co. was reported Nov. 30. All closed at the time of sale, the mines included Nos. 5 and 7 mines of the Franklin County Coal Corp., the Dering mine of the Consumers Co., Eldorado, and the Little Oak mine, Belleville. Plans for re-opening of the Dering mine at Eldorado by members of Local 117, PMWA under a lease agreement with the Woosley company were reported later in December. Members of the local, employed at the mine when closed last April, were planning to form a corporation and employ 250 to 300 men on a hand-loading basis, with the Woosley company salvaging unneeded equipment. Franklin County No. 5 mine is to be dismantled, according to Mr. Becker, who reported that some of the equipment would be used at a new 2,500-tpd operation to be opened by his company near Collinsville. The output, all industrial coal, will be sold by the Collinsville Ice & Fuel Co., it was said.

Bethlehem Collieries Corp., a subsidiary of the Bethlehem Steel Corp., has changed its name to Bethlehem Mines Corp., effective Nov. 23.

Mine acquisitions in Pennsylvania recently reported include the Margaret mine now held by the Century Coal & Stone Co. A small deep mine in Washington County, the property

COAL MEN ON THE JOB



LECKIE COLLIERIES CO.: Charles King (left), electrician, and Charlie Reed, section foreman, Aflex, Ky.



IN PENNSYLVANIA: Albert L. Biscontini (left), Newport Excavating Co., Nanticoke, Pa.; and Guy Mills, coal analyst, Renton mines, Pittsburgh Coal Co., Renton, Pa.



TENNESSEE PRODUCTS & CHEMICALS CORP.: H. E. Barker (left), chief electrician, and Wilson Carr, boom operator, at the central control board built by Mr. Barker to control all underground equipment in the Reels Cove mine, Whitwell, Tenn.

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THIS MAN'S LOOKING FOR SCRAPPERS!



HE'LL BE SEEING YOU!

The big fight's on to lick the scrap shortage!

The shortage is so critical that many steel plants have only a few days scrap on hand.

Get in the fight! Get in the scrap!

Be Ready **for Your District's Scrap Representative!**

The steel industry has mobilized to go out and get desperately needed scrap. Scrap representatives have been appointed in your district. One will call on you soon.

Welcome him . . . be ready for him. Survey your plant *before* he comes so you can tell him how much scrap you can move . . . *or have already moved* . . . to the mills through your scrap dealer.

HERE'S WHAT'S WANTED

Steel mills need tons and tons of scrap over and above "working scrap" which you normally sell. Broken or obsolete machinery and equipment . . . odds and ends . . . rails . . . worn out parts—in fact *all* the iron or steel material that's gathering dust in your plant.

Put a responsible man in charge of rounding up scrap in your plant. *Do it now.* Unless dwindling scrap piles are replenished *immediately* steel production will suffer *immediately.*



Be a Scrapper for Steel... FOR AMERICA

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PA.

Ever wonder why you *never* see a scowling, fagged operator on the Baker, A-C team? Here's why:



They just plain love that "doze-in-your-armchair" ease of control; that positive hold without throttle jockeying; that fraction-of-an-inch accuracy . . . that quick, direct lift; that positive down-pressure which puts almost all the tractor weight on the cutting edge; *and* the "roll-action" of the blade which leaves more tractor power for push. Because "Easy DOZE It!"





That's why you see the Baker, A-C team more and more wherever dirt has to be moved fast and efficiently. When operators *prefer* it, you can count on it being the best money-maker.



Specify Baker Bulldozers, Gradebuilders or Root Rippers for your new A-C Tractors . . . Baker makes engine-mounted hydraulic control models and cable-control models for the entire line of Allis-Chalmers crawlers. See your Baker, A-C Dealer. THE BAKER MANUFACTURING COMPANY, Springfield, Illinois.





P.S.: Baker is the PIONEER and the SPECIALIST in bulldozers

EQUIPMENT APPROVALS

Five approvals of permissible equipment were issued by the U. S. Bureau of Mines in November, as follows:

Joy Mfg. Co.—Type WK85R Model 240 air compressor; four motors, one 50 hp, two 5 hp, and one torque motor; 250 v. DC; Approval 2-821; Nov. 8.

Barrett, Haentjens & Co.—Type Hazleton ¾-hp portable pump; one ¾-hp motor; 250 v. DC; Approval 2-822; Nov. 16.

Long Super Mine Car Co., Inc.—Type PT "Piggyback" conveyor; one 4-hp motor; 220 and 440 v. AC; Approvals 2-823 and 2-823A; Nov. 21.

Joy Mfg. Co.—Type TS5-1PE/F timber setter with hydraulic drill; one 15-hp and two 5-hp motors; 250 and 500 v. DC; Approvals 2-824 and 2-824A; Nov. 28.

Long Super Mine Car Co., Inc.—Type PT "Piggyback" conveyor; one 4-hp motor; 230 v. DC; Approval 2-825; Nov. 29.

formerly was operated by the J. P. Reiland Co. The Eagle No. 1 mine, near Lake Lynn, Fayette County, formerly operated by the Fancy Hill Coal Co., now is being operated by the Chess Coal Co. In Westmoreland County, the Ellena mine, formerly operated by the J. H. Long Coal Co., is now operated by the Pleasant Valley Coal Co.

Preparation Facilities

Australian Dept. of National Development and Joint Coal Board, Ben Bullen colliery—Contract closed with Western Machinery Co. for Wemco No. 5C Mobil-Mill, incorporating a 14-ft-diameter Wemco cone separator to effect heavy-media separation, to handle 300 ltph of minus 5-in coal; 270 ltph of 5x3/16 to be cleaned in the Mobil-Mill, which will produce 5x1¼ and ¼x3/16 cleaned-coal products; installation to also include prefabricated feed preparation section to remove fines from R-O-M prior to entry in heavy-media circuit and a 54-in-diameter Wemco coal spiral to dewater fines.

Lehigh Navigation Coal Co., Lansford, Pa.—Contract closed with Wilmot Engineering Co. for one 6-ft-diameter Wilmot Hydrotator for preparing pea coal; feed capacity, 70 tph.

Lehigh Navigation Coal Co., Coaldale, Pa.—Contract closed with Wilmot Engineering Co. for two 6-ft-diameter Hydrotators for preparing Buck No. 1; total feed capacity, 120 tph.

Koch's Coal Yard, Ravine, Pa.—

WILMOT HAS EVERYTHING FOR RIVETLESS CHAIN CONVEYORS



Contact YOUR NEAREST WILMOT REPRESENTATIVE

BIRMINGHAM 4, ALA. -- Amos A. Culp, 930 Second Avenue, North

CHARLESTON 23, W. VA. -- Cross Pump & Equipment Co., P. O. Box 889

HAZLETON, PA. -- Wilmot Engineering Co., Markle Bank Building

KNOXVILLE, TENN. -- Crowell Engineering & Sales Co., 3045 Sutherland Ave.

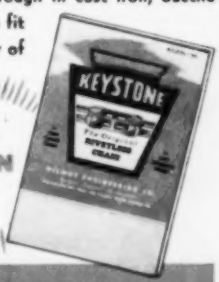
PITTSBURGH 16, PA. -- Harold S. Lusk, 3045 West Liberty Avenue

ST. LOUIS 17, MO. -- Jack Van Horn, 1139 Claytonia Terrace

NEW YORK 38, N. Y. -- International Manufacturing & Equipment Co. (export only), 220 Broadway

Simplify Maintenance by Depending on Wilmot for All Replacements

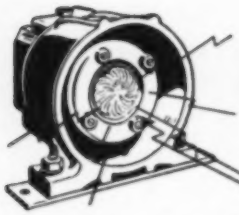
As originators of rivetless chain, Wilmot offers the largest choice of chain sizes and attachments: -- Chain in pitches from 3" to 10½" and working loads from 3,000 to 130,000 lbs.; of drop-forged steel, alloy or cast chrome-manganese steels. Sprockets, traction wheels, flights, take-ups, shafting, bearings and trough in cast iron, ductile iron, carbon or chrome-manganese steel to fit application. See why an increasing number of leading firms solve their design and delivery problems by depending on Wilmot for all conveyor replacements.



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WILMOT ENGINEERING CO.

HAZLETON, PA.
Plant:
WHITE HAVEN, PA.

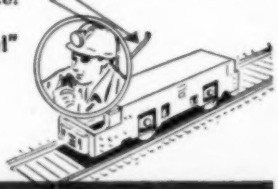


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Modern coal mining means safe mining the Femco way—by Trolleyphone. This instant two-way contact with moving motormen, foremen at the face, and any other section means quick reports and quick action—in time. Dispatcher's orders double-checked! Instant notice of breakdowns or runaway cars to other motormen! All stations called at once!

"Guard Mine Safety—by Trolleyphone!"

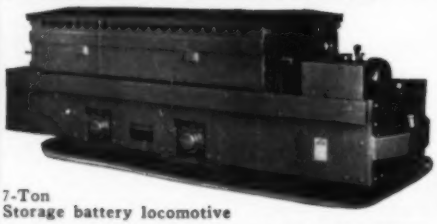
- Alerts crews anywhere
- Gets action anytime
- Stops accidents
- for high safety rating



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Contract closed with Wilmot Engineering Co. for one Type A Wilmot jig for preparing stove coal; feed capacity, 15 tph.

Rosini Coal Co., Shamokin, Pa.—Contract closed with Wilmot Engineering Co. for one Type D Wilmot jig for preparing stove coal; feed capacity, 25 tph.

Colorado Fuel & Iron Corp., Allen mine, East Portal, Weston, Colo.—Contract closed with McNally Pittsburg Mfg. Corp., for complete R-O-M handling facilities for 500 tph of coal or mine rock to be transported from underground storage bins to new surface preparation plant that will break R-O-M into slack size for railroad-car loading; plant complete with house coal and refuse handling facilities and designed for future expansion to 1,000 tph by addition of single breaker unit.

Bell & Zoller Coal & Mining Co., Johnston City, Ill.—Contract closed with McNally Pittsburg Mfg. Corp. for slurry-recovery plant addition to existing cleaning and drying plant for treating 22½ tph of ½mmx0 sludge; sludge cleaned on three Deister tables and recovered coal dried on Peterson filter and returned to existing fine-coal transfer conveyor for loading.

Boone County Coal Corp., Boone No. 2 mine, Monclo, W. Va.—Contract closed with McNally Pittsburg Mfg. Corp. for complete remodeling of existing preparation and raw-coal facilities; 500-tph R-O-M to be reduced to 8x0 in McNally Pittsburg rotary breaker, with refuse from breaker to deliver to washer refuse conveyor; 8x0 broken raw coal screened on present screens at 1¼; 1¼x0 screened at ¾, with ¾x0 dry-cleaned in five McNally Brusset vacuum jigs at 150 tph; 1¼x¾ binned for recombining with feed to wet-washing division; 8x¾ raw coal plus ¾x0 wet by-passed slack washed in one 524FFL McNally Norton automatic washer at 350 tph; middlings plus refuse from dry-cleaning division washed in one 2030 McNally Norton rewasher; cleaned coals classified for 5-track loading at 5, 3, 2, 1¼ and ¾x0 in, with complete mixing and blending of cleaned coals to be available.

Glen Alden Coal Co., Baker colliery, Scranton, Pa.—Manufacture by Glen Alden by agreement with Menzies Separator Co. of two 8-ft Menzies cones to clean stove and nut, respectively; feed capacity, 70 tph each.

Mammoth Coal Co., Raven Run, Pa.—Installation by Menzies Separator Co. of one 10-ft Menzies cone to clean barley (cone previously installed in Mineral Springs breaker); feed capacity, 110 tph.

Glen Alden Coal Co., Woodward colliery, Kingston, Pa.—Manufacture by Glen Alden by agreement with Menzies Separator Co. of seven 8-ft Menzies cones to clean various sizes from egg to barley; total feed capacity, 490 tph.

Pennag Coal Co., Clear Spring, Pa.

How to care for Mining Machine Cables



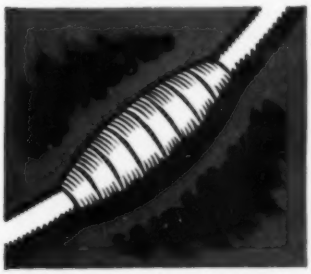
1 Buy cables that can carry the required current without overloading or overheating. They should be flexible (having sufficiently fine strands) for the intended use.



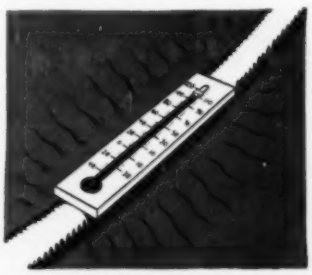
2 Keep voltage in the working sections up to standard.



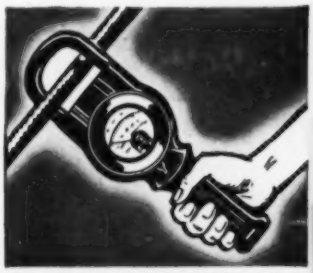
3 Keep bonding up to standard and provide adequate returns.



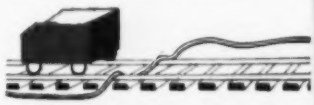
4 Splice properly and vulcanize. Splices should be strong electrically and mechanically and should be well insulated with materials suited to the cable type. The number of temporary splices should be limited and when that limit is reached the cable should be taken out of service and the splices made permanent by vulcanizing. Conductors should be spliced or joined so that they are mechanically and electrically secure without solder and then, unless an approved splicing device is used, they should be soldered with a fusible metal or alloy, or brazed or welded. Sharp edges and points should be avoided in soldering, welding or brazing. All joints and free ends of conductors should be covered with insulation equal to that on the conductors.



5 Avoid overheating. Do not overload. Keep cables as short as possible. Where possible, as in conveyor work, sectionalize the cables into short lengths, giving due thought to safety in the type of cable connectors selected. Long single cables, such as are used in conveyor mining, should be stored in long, loose loops, preferably on the mine floor, since loops on the rib add to the difficulty of fighting any fire that might occur. Do not pile cable in tight coils. On such equipment and mining and loading machines equipped with reels, attach the nips far enough back to spool off the cable. If that is impracticable, unreel the cable and spread it out on the bottom.



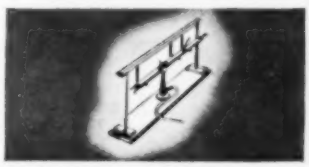
6 Avoid overloading of cables. Where possible, use I.P.C.E.A. recommended current ratings. Where cables are used in one or more layers on a reel, use I.P.C.E.A. recommended factors for reducing the current.



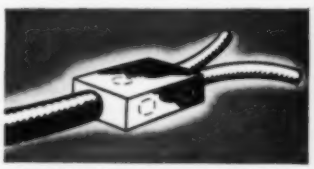
7 Place cables where they can't be run over. Anchor them to prevent jerking, avoid severe twisting and kinking, take precautions against cutting, protect against falls and keep cable tension down.



8 Protect cables with fuses or circuit breakers of the proper rating for the service. Make sure that circuit breakers will operate properly.



9 Use flame-resistant cables wherever possible.



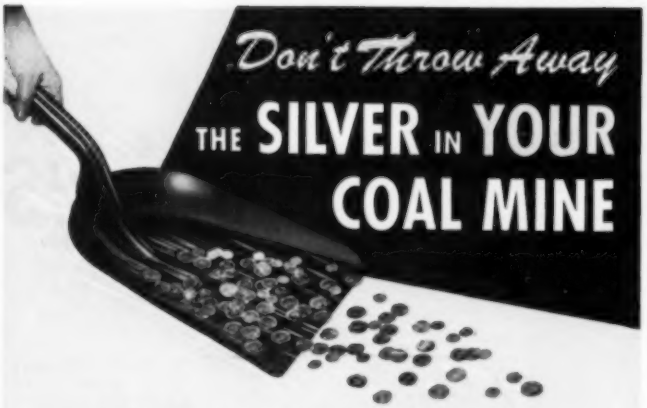
10 Use junction or distribution boxes for making multiple power connections in working places.

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Diminick Coal Co., Paxinos, Pa.—Contract closed with Menzies Separator Co. for one 2-ft Menzies cone to clean No. 4 buckwheat; feed capacity, 7 tph.

Reidinger Coal Co., Paxinos, Pa.—Contract closed with Menzies Separator Co. for one 2-ft Menzies cone to clean No. 1 buckwheat; feed capacity, 7 tph.

NCA Education Group Meets At Colorado Mines School

The coal-mining course now is firmly established at the Colorado School of Mines, members of the Mining Engineering Education Committee, National Coal Association, were told at a meeting in the fall at Golden, Colo., where the school is located. The committee is continuing its policy of meeting periodically at various mining schools throughout the Nation to obtain a first-hand view of opportunities and needs in coal-mining engineering.

Five men were graduated in 1951 from the Colorado coal-mining course and 10 probably will finish in 1952. Dean M. I. Signer urged that coal operators searching for young graduate engineers interview members of the graduating classes as early as possible in the year, lest they be drained off into other mining industries.

During their 2-day stay, members of the committee, led by Henry C. Woods, chairman, and M. D. Cooper, director, heard deans and professors outline the coal-mining courses available, discuss admission standards and describe methods for keeping courses up to date and practical.

Illinois Miners Advance Through Schooling

A total of 131 coal miners in "Little Egypt" have registered in the past year for mining courses offered by a division of Southern Illinois University, Carbondale, Ill. The courses are open to men who intend to take state examinations for mine manager, mine examiner and hoisting engineer.

These helps to promotion first were offered in October, 1950, when the university set up the Vocational-Technical Institute as a special division and named E. J. Simon as director.

A recent questionnaire answered by 71 of the men who have taken one course or more reveals that 65 of those who responded passed the state examination they were pointing for. At least 21 of the men have been certified for mine manager and eight for hoisting engineer. Forty-three out of the 71 have passed the examination for mine examiner.

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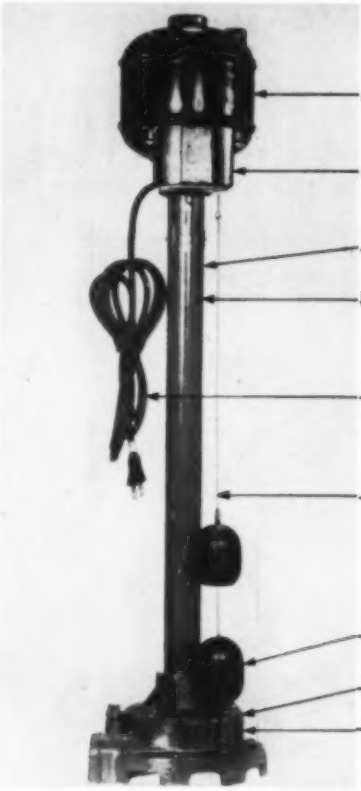
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DEALER INQUIRIES INVITED

New Books for Coal Men

Coal and Fuel Markets

Production, Consumption and Use of Fuels and Electric Energy in the United States in 1929, 1939 and 1947, by W. H. Lyon and D. S. Colby. A statistical history of fuels and electric power in three selected years, prepared as a help in studying fuel requirements and resources in the years ahead and arranged for easy comparisons among the several fuels. *90 pp. 8x10½-in; paper; mimeo. Free, Publications Distribution Section, U.S. Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Pa.*

Making Gas Underground

The Second Underground Gasification Experiment at Gorgas, Ala., by J. L. Elder, M. H. Fies, H. G. Graham, R. C. Montgomery, L. D. Schmidt and E. T. Wilkins. Using the "stream method," whereby gas-making fluids flow past the coal face and make contact with it, the USBM and Alabama Power Co. ran their second underground gasification experiment for 22½ mo. Here's the report on how they did it and what they found out. *72 pp. 8x10½-in; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

Electric Power and Safety

American Standard Safety Code for Installing and Using Electrical Equipment in and About Coal Mines, M21-1951. Revision of the 1926 code, with standards on safe loads for voltage drops, surface and underground power lines and substations, hoisting and belt-conveyor equipment, fans and grounding. The booklet is especially designed for mine electricians and mining engineers. *No price quoted. American Standards Association, 70 East 45th St., New York 17, N. Y.*

Home-Heating Progress

Heating the Home, by S. Konzo, W. S. Harris and R. W. Roose, staff members of the Engineering Experiment Station, University of Illinois, describes eight heating systems, giving prominent attention to the problems of heating basementless houses. Warm-air perimeter heating for basementless homes and hot-water heating with baseboard units are two new methods described in this circular issued by the Small Homes Council. 12 pp., 8½ x 11-in; paper. *University of Illinois Press, Urbana, Ill.*

Other Books and Booklets

Correlation of Domestic Stoker Combustion With Laboratory Tests and Types of Fuels—IV: Combustion Tests of Illinois and Other Coals, by R. J. Helfinstine. Report of Investigations 151. 46 pp. 25c; one copy free to residents of Illinois. Illinois State Geological Survey, Urbana, Ill.

Geology and Coal Deposits of the Linton Quadrangle, Greene and Sulli-



SANDSTONE AND SHALE overburden averaging 40 feet in height. "Nitramon" is loaded in two rows of well drill holes 38 feet deep.



EASY TO HANDLE, "Nitramon" is packed in watertight metal containers which can be loaded immediately after drilling. Photo shows "Nitramon" Primer, with Primacord attached, being lowered into hole. Shot consisted of 3,000 lbs. of "Nitramon."



RESULTS OF THE BLAST show excellent fragmentation obtained with "Nitramon." Breakage such as this speeds up stripping operations . . . permits shovels to remove overburden quickly and economically.

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"Nitramon"—the safest blasting agent known—is widely used for coal-stripping operations. It cannot be detonated with commercial blasting caps, and is insensitive to open flame, friction or even the impact of rifle bullets. A "Nitramon" Primer—itself relatively insensitive—readily detonates the charge. And, "Nitramon" contains no nitroglycerin . . . will not cause headaches.

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van Counties, Indiana, by C. E. Weir. 2 maps, 41 x 54-in. Map C 9, Coal Investigations Series. $1.50, Chief of Distribution, Geological Survey, Washington 25, D. C.; or Division of Geology, Dept. of Conservation, Bloomington, Ind.

Analysis of Haulage Fatalities in Coal Mines, January-June, 1951, by M. J. Ankeny and D. S. Kingery. USBM, I.C. 7622. 14 pp. 8x10½-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

Geology of Anthracite in the East-Central Part of the Mt. Carmel Quadrangle, Pa., by H. E. Rothrock, H. C. Wagner, B. R. Haley and H. H. Arndt. 3-sheet map, 39x42-in. Map C 10, Coal Investigation Series. $1.50, Chief of Distribution, Geological Survey, Washington 25, D. C.

Equipment Tested at the Bureau's Oil-Shale Mine, by F. D. Wright, H. J. Ballinger, E. E. Burgh, B. C. Brown and L. Fieg. R. I. 4180. 13 pp. Free from Publications Distribution Section, U. S. Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Pa.

Further Studies of Ohio Coals and Oil Shales: Part I, Some Studies of Ohio Coals and Oil Shales, by P. O. Krumin; Part II, Ohio Coals, by W. H. Smith; Part III, Oil Shales and Cannel Coals, by C. H. Bowen. Engineering Series Bulletin No. 143. 70 pp. 6 x 9-in; paper. $1, Engineering Experiment Station, Ohio State University, Columbus 10, Ohio.

Bibliography of Pressure Hydrogenation, Part II, Patents, by J. L. Wiley and H. C. Anderson. USBM, Bulletin 485. $1, Supt. of Documents, Government Printing Office, Washington 25, D. C.

The following publications by the U. S. Bureau of Mines may be obtained free upon request to Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. All are 8 x 10½-in; mimeo.

Estimate of Known Recoverable Reserves of Coking Coal in Floyd County, Ky., by J. J. Dowd, L. A. Turnbull, A. L. Toenges, R. F. Abernethy and D. A. Reynolds. R. I. 4813. 16 pp.

Miller Gulch and Cook & White Coal Beds Near Cerrillos, Santa Fe County, New Mexico: Reserves; Coking, Petrographic and Chemical Properties, by L. A. Turnbull, A. L. Toenges, J. D. Davis, D. A. Reynolds and B. C. Parks. R. I. 4814. 29 pp.

Preparation Characteristics of Coal From Fayette County, Pa., by W. L. Crentz, A. L. Bailey and J. W. Miller. R. I. 4815. 16 pp.

Preparation Characteristics of Coal Occurring in Westmoreland County, Pa., by W. L. Crentz, J. W. Miller and A. L. Bailey. R. I. 4823.

Significance of Laboratory Tests of Coal and Coke for Combustion, by J. F. Barkley. I. C. 7619. 46 pp.





COAL MEN ON THE JOB

RED JACKET COAL CORP., RED JACKET, W. VA.: R. A. Ison (left), assistant general manager; G. F. Davis, assistant superintendent, and Julius Howell, general mine foreman, Junior mine. In the engineering department (right photo): N. W. Long (seated, left), resident engineer, Red Jacket district; Donald T. Posten, resident engineer, Wyoming and Coal Mountain mines; G. A. Reilly, supervising engineer; R. P. Grist (standing, left), forester; K. M. Vaughan, draftsman; G. C. Barker, chief draftsman; L. M. Dean, draftsman; and B. J. Maynard, transitman.

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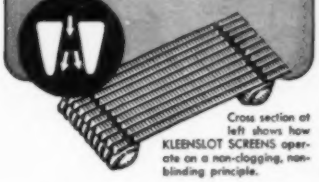
Differential Products Include: Air Dump Cars, Locomotives, Mine Cars, Mine Supply Cars, Rock Larries, Mantrip Cars, Dumping Devices and Complete Haulage Systems.

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Cross section at left shows how KLEENSLOT SCREENS operate on a non-clogging, non-blinding principle.

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...*encourage* workers to use them: They weigh only slightly more than an ounce. Can be worn over long periods, with ease and comfort. Plenty of room for prescription glasses. Readily conform to all facial contours because they are *flexible*.

No safety program is complete without adequate protection of workers' eyes. Why gamble . . . when Willson offers you complete ease of mind, and at low cost?



Flexible Polythene frame readily conforms to facial contour and makes lens replacement easy.

Order now from your nearest distributor, or write direct to WILLSON PRODUCTS, INC., 259 Washington Street, Reading, Pa.

CLIP AND MAIL TODAY



WILLSON PRODUCTS, INC.
READING, PA.

Gentlemen:
Please send me your Industrial Safety Catalog containing information on MonoGoggle and other safety products which can help us prevent eye injuries.

Name _____

Company _____

Address _____

City _____ State _____

Among the Manufacturers

Major changes in the sales organization of the Barber-Greene Co., Aurora, Ill., include the appointment of W. B. Holder, formerly general sales manager, to head up a new division of the company, plans for which are now being formulated and are to be announced later. E. H. Holt, formerly eastern division sales manager, succeeds him as general sales manager. J. D. Turner, with Barber-Greene since 1925, has been named director of publicity and promotion to supervise publicity and advertising and, in addition, will work closely with Mr. Holt on the formulation of over-all sales policy and sales promotion.

Oscar J. Harm has been named sales engineer in the Pikeville, Ky., area, for the Mining Sales Div., Mine Safety Appliances Co., Pittsburgh. A graduate of Pennsylvania State College, Mr. Harm has had considerable mining experience and has been with MSA since 1942, stationed at the company's Pittsburgh headquarters.

The McNally Pittsburg Mfg. Corp., Pittsburg, Kas., has appointed E. C. Griggs as district manager, with offices at 307 N. Michigan Ave., Chicago. Mr. Griggs joined the organization in 1943 as sales engineer in the Chicago territory. The appointment of W. C. Menzies to the McNally Pittsburg sales and engineering staff, effective Jan. 1, also has been announced. Mr. Menzies, long active in development of anthracite coal cleaning, will represent the company in the Pennsylvania anthracite fields. Newly named service engineers for the company are Elliott Northcott, for Southern West Virginia, Eastern Kentucky, Virginia and Southern Ohio; and Wesley Smith, for Illinois and portions of Western Kentucky. Mr. Northcott, who will have headquarters in Huntington, W. Va., formerly was preparation engineer for the Island Creek Coal Co. Mr. Smith, who previously was plant repair foreman at the Fidelity mine of the United Electric Coal Cos., will headquarter at Pinckneyville, Ill.

Kennametal, Inc., Latrobe, Pa., has appointed Benedict (Ben) Teano a representative for southeastern West Virginia and eastern Virginia. Mr. Teano formerly was with the Consolidation Coal Co. (W. Va.), where he worked underground, largely in a supervisory capacity, for almost 15 yr. The company also has announced the assignment of Kenneth Trombley to

HERE'S

half a ton of pull

...TOOL-BELT SIZE

THE NEW 1000-LB. MIGHTY MIDGET PULLER



Combining easy portability with added pulling power, the new Coffing Mighty-Midget does more jobs, does them **easier.** Only 9½ lb. in weight, it fits neatly in a tool box or hangs lightly on a tool belt. Full half-ton capacity makes it a handy time and muscle saver on such jobs as skidding machinery, lifting batteries to shuttle cars, repairing and maintaining equipment. Convenient 2-way handle serves as a lever or high-speed crank.

Equip your crews with these new, stronger Mighty-Midgets. See how their strength and easy portability speed work in mine, shop and tipple. Write for Bulletin G1M.

ONLY $31.00
(500-lb. model $21.75)

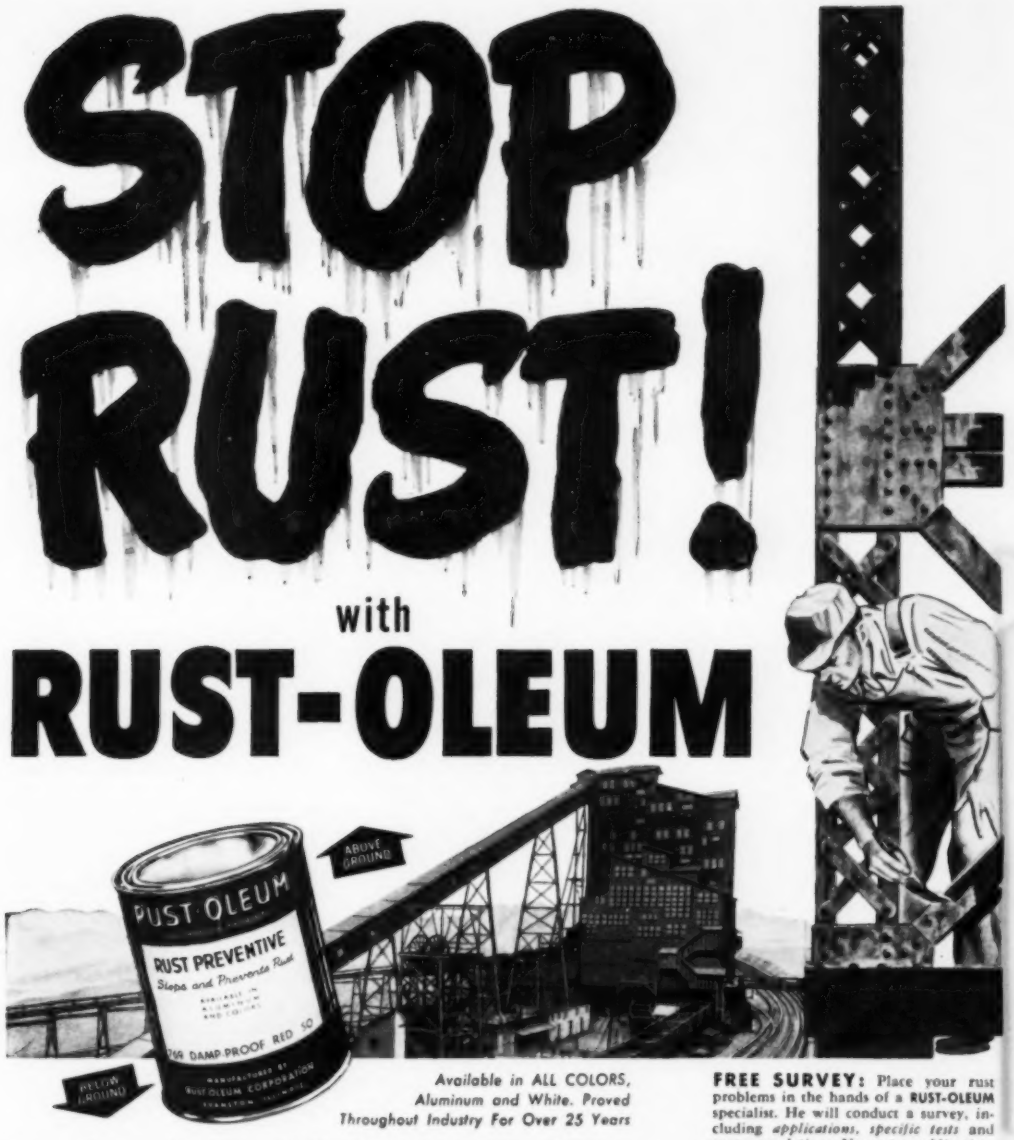
Quik-Lift Electric Hoists • Hoist-Alls • Safety-Pull Ratchet Lever Hoists • Spur-Geared Hoists • Differential Chain Hoists • Load Binders • I-Beam Trolleys

COFFING HOIST COMPANY
Danville, Illinois

STOP RUST!

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RUST-OLEUM



Available in ALL COLORS, Aluminum and White. Proved Throughout Industry For Over 25 Years

Deep underground pipes, coal cars, machinery — tipples and surface equipment — all *rustable* metal surfaces need **RUST-OLEUM!** The *exclusive* formula that resists fumes, moisture, weathering, most acids and chemicals! Goes on easily by brush, dip or spray . . . dries to a firm, *decorative* finish!

May be applied over surfaces *already rusted* after wirebrushing and scraping. Specify **RUST-OLEUM** to your painting contractor or maintenance department for new construction, maintenance or remodeling. Prompt delivery from Industrial Distributor stocks in principal cities. Write for *complete* literature — *today!*

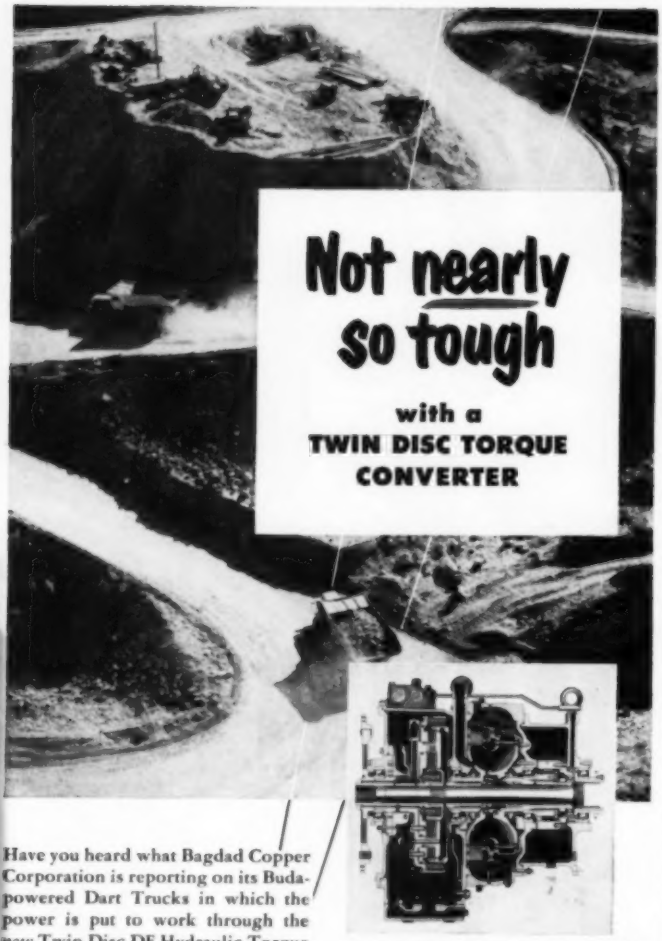
RUST-OLEUM CORPORATION
2461 Oakton Street — Evanston, Illinois

FREE SURVEY: Place your rust problems in the hands of a **RUST-OLEUM** specialist. He will conduct a survey, including *applications, specific tests* and *recommendations. No cost or obligation.* See Sweets for catalog and nearest **RUST-OLEUM** distributor, or write for literature on your company letterhead!



It's Easy To Get The Facts — Clip This To Your Letterhead

- ☐ We Have A Rust Problem — Have A Qualified Representative Call
- ☐ Free Survey
- ☐ Complete Literature
- ☐ Nearest **RUST-OLEUM** Source



Have you heard what Bagdad Copper Corporation is reporting on its Buda-powered Dart Trucks in which the power is put to work through the *new* Twin Disc DF Hydraulic Torque Converters?

"The trucks negotiate the steep grades fully loaded and *without* ever *shifting* gears . . ."

"They return down grade *without using* the brakes . . ."

"Total maintenance and repair costs may be *less than 2 cents per ton*...far less maintenance than ever before . . ."

"Fuel costs per ton of ore hauled with the torque converter have *decreased instead of increasing* as was presumed."

The Twin Disc Model DF is a three-stage hydraulic torque converter with built-in converter braking feature which not only eliminates gearshift guesswork on grades but also, combined with engine drag, can perform 90% or more of the braking. The records the DF is setting are amazing. Write today for details. You may be able to save hundreds of dollars per unit in maintenance savings and faster round trips.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES



TWIN DISC CLUTCH COMPANY, Racine, Wisconsin — HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

the new Tennessee and Alabama sales district, with headquarters at 18 Clearview Ave., Chattanooga. Frank Price has been appointed engineer and representative in the Middle Atlantic district, and Lindsay Bros., of Portland, have been appointed agents covering the western Oregon area.

Robert K. Cooke has been appointed a factory representative for Union Wire Rope Corp., with headquarters in Pittsburgh, Pa. Mr. Cooke recently completed a comprehensive factory and field sales training program set up by the company.

Robert A. Thompson, Madisonville, Ky., has been named a representative for the American Mine Door Co., Canton, Ohio. Mr. Thompson, who succeeds J. B. Templeton, will cover parts of Illinois, Indiana and Western Kentucky.

E. G. Staley Maxwell has been appointed manager of the General Electric apparatus sales office in Charleston, W. Va., and John H. Pharis, Jr., has been named to succeed Mr. Maxwell as manager of the Roanoke, Va., office. Mr. Maxwell, who will be responsible for the company's offices at Roanoke, Charleston and Bluefield, W. Va., replaces James J. Fitzgibbon, who is now manager of the apparatus sales office in Washington, D. C. Mr. Pharis has been on the sales force of the Roanoke office since 1945.

H. Barden Allison has been appointed district sales manager of the Philadelphia branch, mechanical goods division, United States Rubber Co., succeeding A. B. Means, who continues in the capacity of sales advisor. Mr. Allison joined U.S. Rubber in 1918 and since 1947 has been sales manager of the L. H. Gilmer division of the company.

R. P. Parshall, former manager of the Milwaukee branch, Cummins Diesel Sales Corp., has been named regional manager, southeastern region, Cummins Engine Co., Inc., with headquarters at Atlanta, Ga. R. F. Davis, former assistant regional manager, Cummins central region, with headquarters at Chicago, has been promoted to regional manager, Cummins eastern region, New York.

Westinghouse Electric Corp. has assigned new duties to two vice presidents, in a move designed to expedite the company's defense activities. L. E. Osborne, formerly vice president in charge of manufacturing, has been named to the newly created post of executive vice president — defense products for all defense efforts of the company. Tom Turner, vice president in charge of labor relations, assumes the manufacturing responsibilities formerly assigned to Mr. Osborne, with the title of vice president in charge of manufacturing and labor relations.

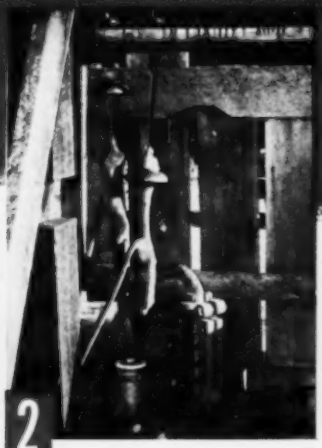
Cooke-Wilson Electric Supply Co., Pittsburgh, Pa., and Charleston, W.

5 GOOD WAYS TO INSTALL SHAFT OR BOREHOLE CABLE



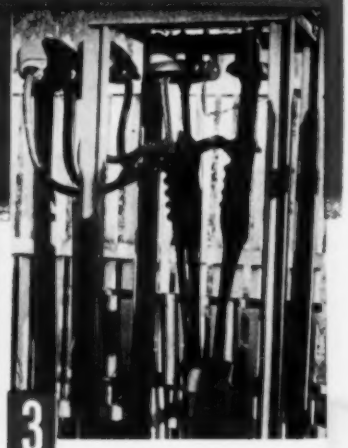
1

LIGHT-WEIGHT ALUMINUM BOREHOLE CABLE suspended by strain insulators clamped to conductors. This 5KV cable with ground wires is 3/c 350,000 CM with Hazard long-lived, high voltage Keystone oil-base insulation and an overall covering of a tough, moisture, flame, and weather-resistant Hazaprene ZBF Sheath. Borehole is 700 feet deep and carries a 2,300 volt a-c circuit to an underground rectifier station. Cable length is 1050 ft. from outside power line to underground station.



2

CONCENTRIC SHAFT-CABLE INSTALLATION 250-volt, d-c, 1,000,000 CM concentric cable suspended in conduit in shaft by means of I beams installed over shaft opening. Concentric conductor clamped, with copper strands bent back and refastened over clamp. Two 350,000 CM, 250-volt d-c cables also installed in shaft in conduit. These cables are supported from steel beams by strain insulators and clamps to conductors. All insulation is 600-volt Watertite with a protective sheath of Hazaprene ZBF.



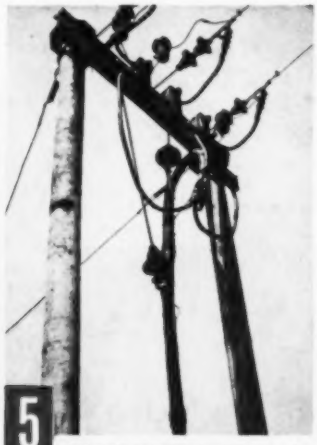
3

4 CABLE INSTALLATION suspended from simple steel structure. Each cable is 500,000 CM, carries 550 volts d-c with two positives and two negatives. Conductors have Hazard moisture-resistant, 1000-volt, Watertite insulation. Unequalled outside protection against moisture, flame, acids and mechanical damage is provided by tough Hazaprene ZBF Sheath. Borehole is 500 feet deep with cables held by strain insulators and strain clamps on conductors.



4

SIX D-C FEEDER CABLES installed in a 600-foot borehole. Each cable is 250,000 CM, with 600-volt Watertite insulation and a tough Hazaprene ZBF Sheath. A strain insulator with clamp connected to the conductor supports these cables individually from simple steel structure.



5

4100 VOLT TRANSMISSION LINE to underground pumping stations and power-conversion stations for d-c haulage and mining equipment. Cable is a 3/c, 4/0, 5000-volt Hazard Borehole cable with long-lived Keystone oil-base insulation protected over-all by a Hazaprene ZBF Sheath. Suspension is accomplished by two strain insulators and Kellems grips.

HAZARD MINE POWER CABLES ENGINEERED FOR BOREHOLE USE GIVE YOU A DIRECT, TROUBLE-FREE, ECONOMICAL CIRCUIT TO UNDERGROUND WORKINGS

THERE are many good ways to install borehole or shaft cable, and on this page are shown some typical methods that have proved successful.

Of vital importance, of course, to any borehole or shaft installation is the design and construction of the cable used. And there is a wealth of first-hand experience in the selection of mine power cables readily available to you. Over the years, much Hazard research and engineering has been devoted to developing specialized mining cables—in cooperation with mining engineers — that simplify installation problems and costs . . . that assure long, trouble-free service.

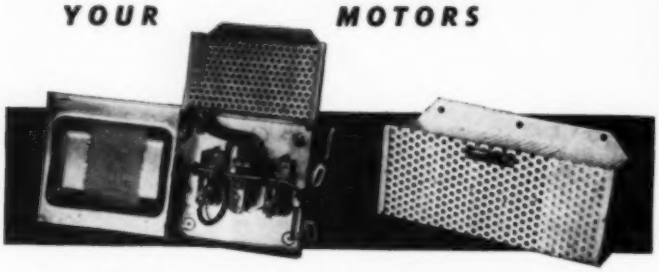
An experienced Hazard engineer is glad to discuss your own particular operating requirements with you. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

7748

HAZARD

SMOOTH STARTS with GUYAN

D. C. STARTERS
MEANS LONGER TROUBLE-FREE SERVICE FROM YOUR MOTORS



GUYAN TYPE MMS MOTOR STARTER
Manually operated — automatically makes armature-to-line connection at proper speed to insure smooth starts after power disruptions. Solderless lug connections.

GUYAN TYPE CMS MOTOR STARTER
Limits initial inrush of current—permits smooth starts—prevents arcing. Requires no operator. Similar to type MMS except for omission of manually operated starting switch.

Write for bulletins

GUYAN MACHINERY CO. LOGAN, W. VA.

4 STAR TIMER

- ★ No false contacts
- ★ No chatter
- ★ Quiet in operation
- ★ Eliminates double contacting or breaking of circuit

HYDROGEN PACKED

Durakool
STEEL MERCURY TIMERS



The steel-clad "fixed time" Durakool timer-relay operates in "sealed in" hydrogen under pressure, with mercury to mercury contacts. Timing is tamperproof. Non-breakable and built for millions of contacts. Fixed time delays available from 1/6 to 20 seconds, either normally open or normally closed action.

See Telephone Directory for Local Distributor or write Durakool, Inc. Elkhart, Indiana

Send for Bulletin 800



Fuller Expands Plant

THIRD NEW FACILITY to be completed in the last year by Fuller Mfg. Co., Kalamazoo, Mich., is this 56,000-sq ft manufacturing plant to be devoted exclusively to "small, miscellaneous transmissions parts," E. L. Ludvigsen, president, recently announced. With the new modern building, the company will be able to use the present main plant, which also has been enlarged, for the manufacture of major parts and final assembly of Fuller transmissions. It also has equipment expansions underway at the foundry department in Kalamazoo and at the unit drop forge division, in Milwaukee.

Va., has elected Thos. W. Henderson vice president and general manager, with offices in Pittsburgh. Mr. Henderson entered the supply business in 1947, after some 15 yr in the operating department of the West Penn Power Co.

Ray-Brooks Machinery Co., Inc., Montgomery, Ala., and the Tractor & Equipment Co., Inc., Birmingham, have been appointed distributors for Bucyrus-Erie Co.'s excavator line, in addition to the Bucyrus-Erie tractor equipment which they also handle. Tractor & Equipment Co. serves the northern half of Alabama, and Ray-Brooks Machinery Co., with branches in Mobile and Pensacola, serves a territory that includes the southern half of Alabama and part of Florida.

To provide for the steadily expanding scope of its experimental laboratory, development research, and technical services, Reliance Electric & Engineering Co., Cleveland, has promoted John L. Fuller to the newly created administrative post of manager of research and technical services. Mr. Fuller joined the company in 1936 and formerly was technical co-ordinator in Reliance's engineering department.

Caterpillar Tractor Co. has announced an expansion program that will include a new factory in York,



Sinclair Litholine PROVED in wheel bearing tests

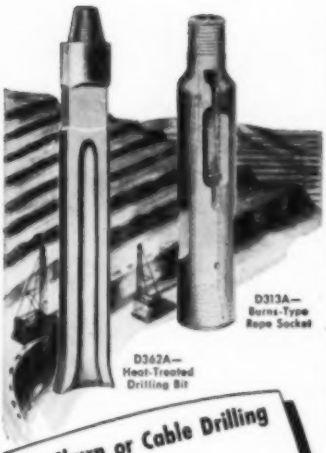
● The critical test of any multi-purpose grease is in its performance in the wheel bearings of heavy-duty mobile equipment. Sinclair LITHOLINE® Multi-Purpose Grease has been proven an outstanding heavy-duty wheel bearing lubricant in exhaustive year-round tests.

One test was made in a Mid-West city bus line. An inspection after 20,000 miles showed the bearings were smooth and well-lubricated. There were no signs of scratching, pitting, heat spots, gum or varnish. Sinclair LITHOLINE's original character was well-maintained – there was no slumping in the bearing or housing, no softening or liquefying, no separation and no leakage through seals.

This safe, sure lubrication of one of the most vital points of heavy-duty mobile equipment . . . and its outstanding performance at all other lubrication points . . . prove that Sinclair LITHOLINE is a real multi-purpose grease . . . winter and summer.

Send for a free folder describing demonstrations of the superiority of LITHOLINE. Contact your local Sinclair Supplier or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

for every grease lubrication job... **SINCLAIR LITHOLINE**



For Churn or Cable Drilling
of
• BLAST HOLES
• PROSPECT HOLES
• SAMPLING
SAFE • EFFICIENT • ECONOMICAL

Spang Churn or Cable Tools are top performers in their fields for drilling test holes when prospecting or sampling . . . drilling blast holes for fragmentation of minerals or overburden . . . drilling and reaming escape, dewatering and ventilating holes . . . and drilling wells for other purposes. Fifty years' experience serving oil, water-well, mining and quarrying operations assures their value.



D606—Reamer-Type
Pilot Bit



LARGE BITS
for pilot hole drilling and stage enlargement reaming of dewatering, ventilation and escape holes.

D370F—Prefabricated
Star Bit

SPANG CABLE TOOLS
made by
SPANG & CO., BUTLER, PA.
for
• SHOT BLAST HOLES • WELL DRILLING
• PROSPECT DRILLING • SAMPLING

Pa., extensive additions to the Joliet, Ill., plant, and some improvements in the Peoria, Ill., plant. The York plant will be built on a site of approximately 180 acres just outside the city limits and will cover about 360,000 sq ft of floor area, with about 1,000 persons employed. Major additions to the Joliet plant will be a 230,000-sq ft extension to the present manufacturing building, a separate parts building covering 280,000 sq ft and an addition to the heating plant. Over 1,900 people are already employed at Joliet, which will be increased to over 3,000 next year. Upon completion of the new additions, about 1,000 more employees will be needed. In announcing the program, President L. B. Neumiller said it has been made necessary by continuing expansion in the demand for Caterpillar machines and parts. The major portion of the program, he said, will be financed with a long term loan of $35,000,000.

The Salem Tool Co., Salem, Ohio, has added to its plant capacity a new glass and steel building 60 ft wide by 280 ft long, equipped with 25-ton overhead traveling cranes. Additional machine and welding equipment is being installed to enlarge capacity for production of coal recovery drills and blasthole drills designed to meet the demand for constantly heavier equipment that will drill larger holes and deeper holes.

The Canadian business of the American Air Filter Co., Inc., Louisville, Ky., is being handled by American Air Filter of Canada, Ltd., Montreal, effective Jan. 1. Wm. G. Hole, formerly of Darling Bros., Ltd., will be in charge of all Canadian operations and representatives will be established in the larger Canadian cities to handle AAF products.

The Economy Pump Div. of Hamilton-Thomas Corp., Hamilton, Ohio, is being consolidated with the C. H. Wheeler Mfg. Co., Philadelphia, another division of the corporation. Production engineering and sales departments of Economy are being moved to the Philadelphia plant and Economy pumps will henceforth be known as Wheeler-Economy pumps. Expansion and modernization of the Philadelphia plant also is being planned as part of the consolidation.

Tell Others, Too . . .

NEWS OF YOUR ORGANIZATION is also interesting to others, so why not make it a point to inform COAL AGE of personnel changes among your staff members, mine-development plans and unusual company activities. Just write: The Editor, COAL AGE, 330 West 42nd St., New York 36, N. Y.



GOOD BELTS GIVE BETTER SERVICE WITH CRESCENT FASTENERS . . .

For all kinds of flat belting, conveyor, transmission and elevator. Full belt strength for full life of belt. No metal touches pulleys. Thousands in use. Send for complete details.



Outside Pulley side

CRESCENT BELT FASTENER COMPANY
480 LEXINGTON AVENUE, NEW YORK 17
BIRMINGHAM, ENGLAND, 32 PARADISE STREET
TORONTO 1, CANADA, 65 MARKET STREET
Distributors Throughout the World



"W" DENTED SHAKER SCREENS

A "must" when it comes to obtaining an efficient job! *Good* because the spreading and collecting riffles give uniform spread of material over the entire screen surface . . turns the top and middle flow of material down in direct contact with the screen . . . gives an increased screening efficiency up to 33% on fine sizes over an undented flat screen.

Comes in Carbon and Stainless Steels and Manganese Bronze. No sag.

Write us today. We shall reply promptly.

REMALY
MANUFACTURING CO., INC.
TAMAQUA, PA.

MINING MACHINE CABLES

For cables that stay on the job longer . . .
ROEBLING!

THE JACKETS of Roebling Roeprene Mining Machine Cables are "lead-mold" cured to assure that all components of the cables are firmly held in place. The finished product has exceptional dielectric and physical strength . . . the tough outer surface is highly resistant to water, sunlight checking, acids, alkalis, oil and grease.

But more than that, every feature of these cables contributes to maximum flexibility and service life. Their neutral, for instance, is made of flat, braided copper which provides the ultimate in elongation and flexibility in any direction. And the neutral is covered with braided cotton to cushion and reduce abrasive action between copper and insulation. Service experience has proven this Roebling design so effective that it is now being widely imitated.

Large quantities of Roebling's full line of electrical wires and cables are called for in the national rearmament program. The Roebling organization and distributors will always, however, give you the best service and deliveries within their power. John A. Roebling's Sons Company, Trenton 2, New Jersey.





ROEBLING

Atlanta, 934 Avon Ave ★ *Boston*, 51 Sleeper St ★ *Chicago*, 5525 W. Roosevelt Rd ★ *Cincinnati*, 3253 Fredonia Ave ★ *Cleveland*, 701 St. Clair Ave, N.E. ★ *Denver*, 4801 Jackson St ★ *Houston*, 6216 Navigation Blvd ★ *Los Angeles*, 216 S. Alameda St ★ *New York*, 19 Rector St ★ *Odessa, Texas*, 1920 E. 2nd St ★ *Philadelphia*, 230 Vine St ★ *San Francisco*, 1740 17th St ★ *Seattle*, 900 1st Ave, S. ★ *Tulsa*, 321 N. Cheyenne St
Export Sales Office, *Trenton, N. J.*





COAL MEN ON THE JOB

HUTCHINSON COAL CO. (left photo): Jess Nelson (left), mine foreman; R. E. Ross, assistant mine foreman; and R. S. Quinn, assistant mine foreman, Melville No. 11 mine, Stollings, W. Va.

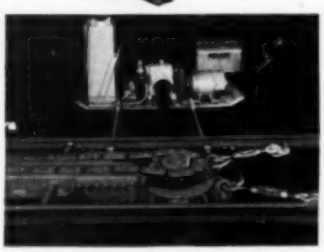
LECKIE COLLIERIES CO. (right photo): Lee Brown (left), transitman, and Lacey Mills, rodman, Leckie and Borderland Collieries; and Charles A. Watts, draftsman for the entire Leckie organization, Aflex, Ky.

Remarkable Profit Record now being piled up by the NOLAN PORTA-FEEDER!



● A new money-maker for big and small coal companies is now proving itself in dozens of applications. The efficient new Nolan Porta-Feeder has made savings as high as 40 minutes per shift in spotting cars for loading!

The Porta-Feeder mounts between the rails on top of the track ties, secured by jacks that permit quick movability. Little or no excavation or preliminary foundation work is necessary. The drive is on skids and is connected to the gear head by a strong universal joint and propeller shaft assembly. A sealed drive head allows operation in water up to the base of the rails. Reciprocating pushing dogs deliver constant forward feeding motion.



Strong, massive construction. No ropes or cables. Short-shaft delivery of power. Quick movability of entire unit.

Write for full details immediately!

NOLAN

MODEL	H. P.	DRAW BAR PULL	SPEED	WEIGHT
NL5N	5	6000	25 F.P.M.	5700
NL7N	7½	9000	25 F.P.M.	5850
NL10N	10	9000	35 F.P.M.	6300
NL15N	15	13000	35 F.P.M.	6750

THE NOLAN COMPANY 106 PENNSYLVANIA ST. BOWERSTON, OHIO

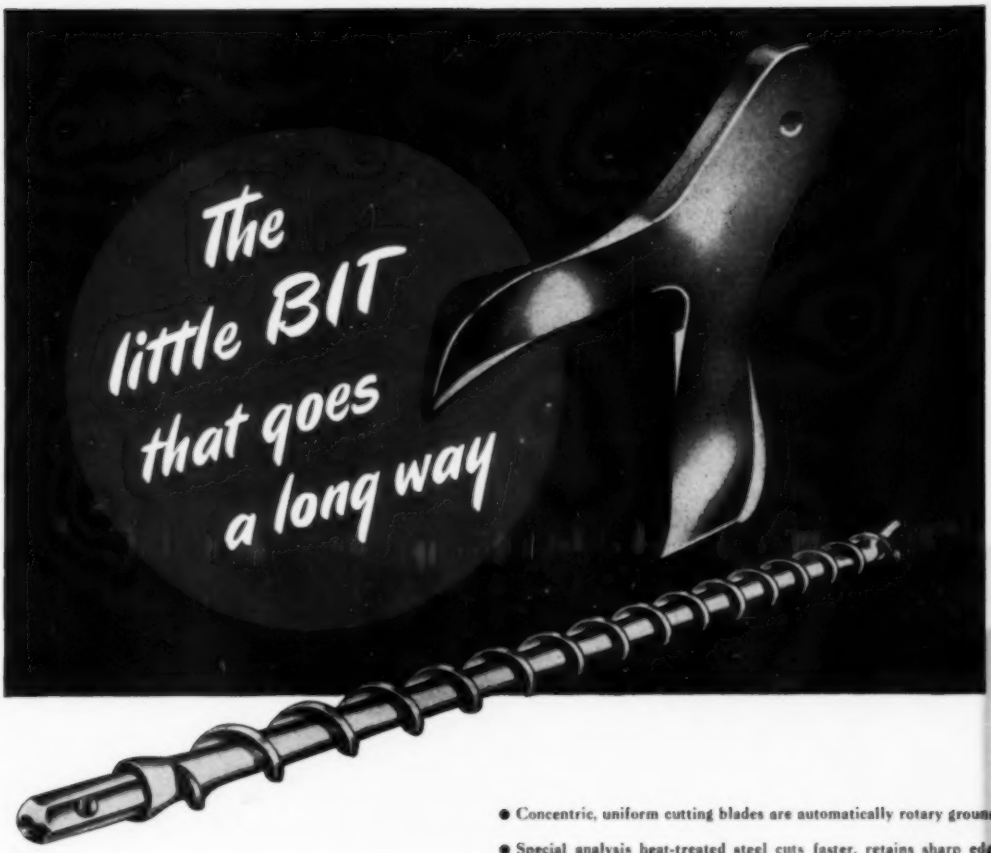
5 REASONS WHY ABC BRATTICE CLOTH IS Better



- ✓ **TOP QUALITY MATERIALS**
- ✓ **FLAME RESISTANCE** Make Your Own Flame and Durability tests. One of our modern flameproofing units shown above.
- ✓ **BLAST RESISTANCE** Face Shots or other Explosions won't tear or stretch it. Not readily punctured by Tools, etc.
- ✓ **MILDEWPROOF** Harmless Chemical impregnation completely resists mildew, molds, fungus.
- ✓ **PRE - SHRUNK**

Makers of MINE-VENT Flexible Tubing. ABC Inflatable Brattice. 25 Years of Service to the Mining Industry

200 S. BUFFALO ST., WARSAW, INDIANA



Coalmaster "1046" Drill Bit for 1⅞" Holes
. . . Teamed with Spir-L-Weld Auger . . .
Gives Longer, Faster, Cleaner Service

- Concentric, uniform cutting blades are automatically rotary ground.
- Special analysis heat-treated steel cuts faster, retains sharp edge longer.
- Advanced two-prong spiral design reduces power consumption.
- One-piece solid shank assures longer life.
- Quick-change bit fits into detachable or weld-on type drill head of Series 0875 "Matched Set" auger.

SPIR-L-WELD AUGER FEATURES



- High Tensile Alloy Steel Tubing
- Light Weight with Rigidity
- Uniform Pitch
- Spir-L-Welded to Core
- Maximum Conveyance with Minimum Flight Drag

Order from your nearest Coalmaster distributor

- **Austin Powder Co.** Cleveland, Ohio
- **The Buda Co.** Harvey, Ill.
- **Diamond Supply Co., Inc.** Evansville, Ind.
- **Dooley Brothers** Peoria, Ill.
- **Drillmaster Supply Co.** Evansville, Ind.
- **Illinois Powder Mfg. Co.** St. Louis, Salt Lake City
- **Joy Manufacturing Co.** Main Office, Pittsburgh, Pa. Representatives throughout the world
- **Mobile Drilling, Inc.** Indianapolis, Ind.
- **Salem Tool Company** Salem, Ohio

DRILLING COALMASTER TOOLS

Write for your copy of new Coalmaster Catalog.

CENTRAL MINE EQUIPMENT COMPANY
ST. LOUIS 15, MO.

CUT DRILLING COSTS !!!

BLAST HOLE AND COAL RECOVERY DRILLS



● McCarthy Self-Propelled Horizontal Blast Hole Drills get in and out of tight quarters quickly; adjusts on four individual leveling jacks for proper drilling heights. Excellent for low level work.

Heavy
Rugged
Powerful

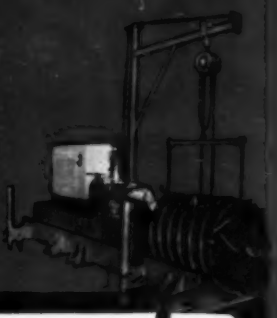


● Compact mobile-mount unit for vertical blast drilling. Automatic swivel hydraulically operated. Straps are every drilling motion positive, cuts drilling cost per foot.



● Truck Mounted Horizontal McCarthy Drills are breaking drilling records everywhere! All necessary equipment is carried with the unit — **out of the mud at working level!**

● McCarthy Coal Recovery Drills are revolutionizing both deep and strip mine operations. As the auger purges its steady streams of clean coal are pulled out without touching the overburden. Average daily output ranges from 15 to 50 tons per worker-shift. Heavy models are available. The machine illustrated above is equipped with a 30-inch auger, retriever joint and Lump Drill Head.





● Here's a Vertical McCarthy Unit on a Half-Track. Compact construction makes McCarthy Drills perfect for all mountings . . . truck, half-track, cat, jumbo or other special rigs.

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Instant-action control selects any speed up to 6 feet per minute.

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Determines rotating speed of power

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● **If you haven't already seen a McCarthy at work, we suggest you see one quick!**

These rugged, powerful units have gained universal acceptance as the most efficient machines ever made for drilling blast holes. Furnished with gasoline, electric or diesel power.

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Write Salem Tool today for full facts. Also ask about McCarthy Coal Recovery Drills — the machine that's being acclaimed in so many trade journals for its remarkable ability to reduce mining costs.

DRILLING EQUIPMENT SINCE 1901

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Kentucky Institute Meets

Begins on p 144

the belt from needless stops and starts.

Feeder lines should not be on the belt entry and the branch circuits to the belt drives should be placed in conduit, Mr. Zegeer said. If possible, cables should not have to cross the belt and, in any case, they should be protected at the take-off from the feeder line by a fused trolley tap or a fused switch. For fire fighting, 10 bags of rock dust in cans or boxes should be stored on the intake side of all head and tail pieces and every 500 ft along the belt. A water line at least 2-in in size, preferably supplied with static pressure from a tank should parallel the belt, with taps every 150 to 500 ft. Fire extinguishers and telephones near all head and tail pieces are a must.

Installation aligned on an engineer's spad line with frames properly leveled is highly important, Mr. Zegeer continued. If the roof character is such as to require extensive timbering when once broken, height for shuttle-car dumping in low coal is best secured by setting tail pieces in the bottom. Electrical controls making wide use of rotary switches should provide drive shut-off in case of belt slippage. They should also provide sequence starting of belts in series, regulation of belt load, overflow protection, positive lock-out for inspection and maintenance, pull-cord stop-and-start above the belt and automatic loading-point control. Mr. Zegeer showed pictures of round floats which are contacted by the coal in the car to move the trip.

Figuring Insurance Rates

How his company arrives at rates approved by the state for workmen's compensation insurance in coal mining was explained by D. M. Munn, actuary, Bituminous Casualty Corp., Rock Island, Ill. Approximately 67½% of the premiums goes for payment of losses and the remainder to pay for the cost of doing business. He also outlined the features of a retrospective rating (a lower than average rating), which may be attractive to an employer who believes that his future experience will be better than average and agrees to pay additional premium if it turns out to be worse.

Drilling Gas Wells in Coal

Papers on drilling gas wells through coal measures stirred up considerable discussion from the standpoints of the loss of coal and dangers of gas leaks into the mines. In his paper, Foster L. Apple, resident manager, Ford Motor Co., Stone, Ky., reviewed past history leading up to the present status of mineral leases and then told of the problems that depend upon interpretation of those mining rights and privileges.

Well locations are a source of friction between gas and coal companies

PORTABLE COAL PREPARATION UNITS



(Patent Pending)

• Comprised of hopper, feeder, screen, picking table and single roll crusher. Capacity—125 or 150 tons per hour. Large heavy-duty Timken double-row roller bearings in the eccentrics and pillow blocks. Over-size Torrington spherical roller bearings in the crusher. The crushers are adjustable from ¾" to 10" opening. Screened coal over the picking table is diverted by a flap-gate to the crusher or mixed with the slack for mine-run. The screen has a snappy action, resulting in efficient screening.

The picking table has a smooth motion which allows selective picking of the impurities which are disposed of in the trough running over the center of the picking table.

The unit is equipped with magnetic starters and push-button controls, 10 to 15 HP motor on the crusher, 5 HP motor on the screen and picking table. It can be readily transported from one location to another on a standard long-wheelbase truck, with minimum cost for moving and erecting.

When used in conjunction with a belt or chain conveyor, the unit can be adapted to various arrangements for handling the coal from the trucks or mine cars, through the cleaning unit, to the railroad cars or bins.

The use of oversized anti-friction bearings throughout these two unit sizes insures trouble-free operation, with low power and maintenance costs.
Full information upon request.

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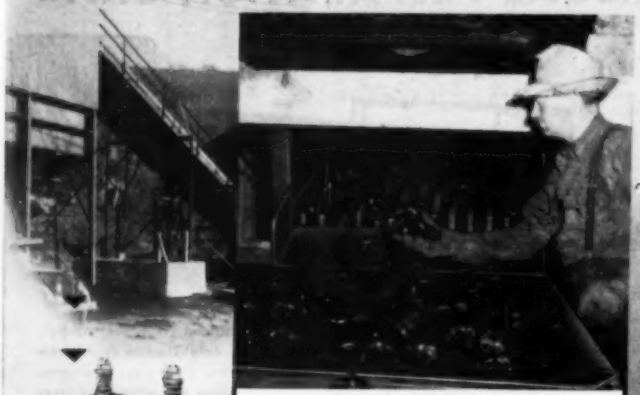


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Syntron Grizzly Feeder feeds run-of-mine coal, bypassing the fines, onto a Syntron Picking Table for removal of rejectable material—slag, stone and slate—by a hand-picking operation.



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Syntron Picking Tables, used throughout the Coal Mining Industry, raise the efficiency of a process where a hand-picking operation is the most economical.

Variable control of flow . . . consistent smooth, even feed . . . low rounded walls . . . very short vibration stroke—are the features incorporated in Syntron Picking Tables that assure higher picking efficiency with less fatigue to the pickers.



VIBRATING GRIZZLIES
VIBRATING SCREENS

Coal preparation affords a wide scope of applications for the easily adaptable Syntron Equipment. In Coal Preparation Plants, Syntron Equipment supplement each other in the coordinated step-by-step processing of run-of-mine coal. **Syntron Vibrator** on surge bin insures steady, dependable supply to the vibrating grizzly. **Syntron Vibrating Grizzly** provides coarse sizing operation and variable controlled flow to the picking table. **Syntron Vibrating Picking Table** moves large chunks forward, smoothly and evenly, for easy hand picking and to the crusher for reduction. **Syntron Vibrating Screen,** supplied from the grizzly and the crusher, sizes the coal. **Syntron Vibratory Feeder** feeds the sized coal in a gushing torrent or a trickling dribble to driers or loading chutes.

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because the gas company wants them in favorable locations as indicated by geologists and where the cost will be at a minimum, while the coal company seeks to have the well interfere the least with mining operations, add no hazards and cause the smallest loss of coal. Closer cooperation between the two industries should remove much of the friction. Drillers' errors in logging wells often are so large that plugs are set incorrectly. Mr. Apple supports the suggested practice that a registered professional engineer be on the job when wells are drilled, cased and plugged through coal-bearing measures.

Setting casings by collar or casing shoe and the methods of cementing casings present problems which the coal industry should study to determine those methods least likely to cause leaks into coal seams. There is the problem of just what constitutes a commercial well as specified in a lease. Whether it is feasible to keep a well in production until the pressure reaches zero and then to recover the pillar around the well is another question. Plugging can be done in many ways, and it was recommended that the coal industry conduct experiments to determine the most effective method and also whether plugging definitely shuts off gas.

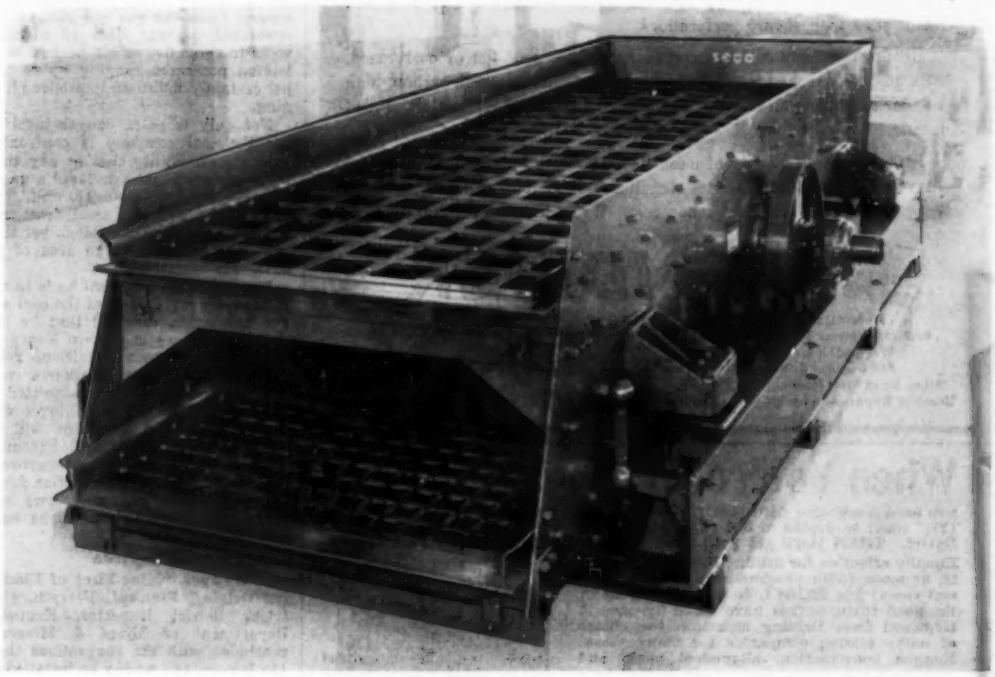
At the direction of the Kentucky Department of Mines & Minerals, pillars at least 200 ft square are left around gas wells and can never be removed. Whether it would be possible to remove these protective pillars if a plugging system and material can be found to effectively shut off the gas from the formations also was posed by Mr. Apple. There is need for a system of records similar to county records of deeds so that the owner of a property can secure all information relative to any wells that have been drilled on the property. Mr. Apple recommended formation of a joint committee of the two industries to study the common problems.

David M. Young, geologist, Kentucky West Virginia Gas Co., Prestonsburg, Ky., presented a detailed written discussion of Mr. Apple's paper and indicated that his company cooperates to the fullest with the coal companies. In eastern Kentucky, the coal and gas industries really need a coordinate map system with adequate ground control that will permit any well location to be spotted with precision upon maps of any coal or gas company.

In discussing jointing and seating of well casings, Mr. Young pointed out that the gas company strives for methods which will provide the most efficient production and that in such a case the coal seams penetrated by the well will be automatically protected. He described in detail his company's eastern Kentucky practice of running five or six strings of casing. Regarding the suggestion for a central well-record depository in the state, there would be no difficulty in obtain-

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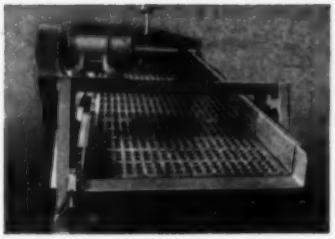
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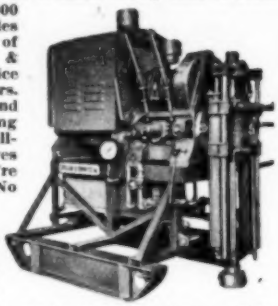
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you need a machine with plenty of strength and power—able to drill 3" holes (2⅛" core) to depths of 500 ft. or more, using a Series M Double-Tube Core Barrel. THEN you'll get good cores from coal or shale or any kind of rock.

Equally effective for drilling to depths of 1000 ft. or more (with progressively smaller holes and cores) the MODEL 40-C embodies all of the good features that have made Sprague & Henwood Core Drilling Machines the choice of many mining companies for many years. Rugged construction, alloy-steel parts and anti-friction bearings throughout, permit long periods of trouble-free high-speed core drilling at minimum expense. Bulletin 185 gives complete information. Write for it if you're interested in better cores at lower cost. No charge or obligation.



Model 40-C Diamond Core Drilling Machine, with Gasoline Engine Power Unit and Oil-Operated Hydraulic Swivelhead.

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have proved their superiority for years in all types of rock formation. Available in a wide variety of standard and special types ranging from 1½" to 7¾" in diameter. All bits set with first-grade African bortz unless otherwise specified. Bulletin 44-A gives complete information.



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See our four-page insert in the Mining Catalogs

ing records from the gas companies but that is not the case with individuals who drill single and isolated wells, Mr. Young said.

Noah Howard, chief engineer, Elkhorn Coal Corp., Wayland, which has some 1,200 wells on its property, said that while they have problems aplenty, they are not with the gas company doing the good job outlined by Mr. Young, but rather with wildcatters. A vent line is an admission that plugging is not effective, he pointed out. Mines have been shut down because of gas escaping from producing wells 500 ft through coal. Furthermore, in several cases the gas companies have connected to vent lines of plugged wells to serve five or six houses. Registered pressures ranging up to 150 psi certainly indicated improper plugging.

Not only is there danger involved but the coal company is confronted with the possibility that at any time its operation may be declared a gassy mine because of a leaky well. The placing of a well on a small tract, say 5 acres, cannot be controlled, yet that well may affect a large area of an adjoining coal tract.

Mr. Sisk, who said that he is in the middle of the problems of the coal and gas industries, reported that he has closed six mines in eastern Kentucky because of gaseous conditions from wells. After the gas pressures were relieved, the mines were permitted to resume. No permit for drilling a well through old coal workings will be issued unless it can be drilled through an adequate pillar. The department has to use coal mine inspection funds to enforce the gas well laws and those laws are inadequate, he said.

Electrical Mine Fires

In a paper, "Mine Fires of Electrical Origin," Frank J. Forsyth, electrical district inspector, Kentucky Department of Mines & Minerals, concluded with the suggestions that: (1) low-voltage wiring be installed on insulators and preferably in conduit; (2) trailing-cable splices be made thoroughly and be well insulated; (3) equipment wiring be safely installed and maintained; (4) lightning arresters be used, with the very best type selected; (5) trolley wires be protected from roof falls, fuses maintained in branches to small loads, power be cut off trolley wires when not needed; and (6) the state department be called on when in doubt as to the safest method or equipment to use.

Of the 16 mine fires occurring in Kentucky in the past 24 mo, which without doubt were of electrical origin, 9 were caused by trolley wires. Other causes were: short circuit, 1; trailing cable, 2; cutting machine, 1; defective locomotive wiring, 1; and lightning, 2. The state had two other fires of probable electrical origin. The fire originating in a cutting machine resulted from ignition of hydraulic oil by wiring. The major hazard created by the combination of hydraulic oil



SENSIBLE IDEA about hauling coal

Most mining men will certainly agree that it takes trucks with plenty of pull and push to stand up in rugged service without lagging behind schedule.

Reason enough why so many are switching to powerful Dodge *"Job-Rated"* trucks!

Just look over a hefty Dodge 4-tonner, for example. Under the hood you'll find a massive, yet thrifty, power plant—with 154 husky horses that will prove more than a match for even your toughest loads!

You'll find many other dependable Dodge features, too. Features like twin carburetion and exhaust system, sodium-filled exhaust valves, and surface-hardened bearing journals—all there to assure utmost dependability, long life and low-cost operation in mining service.

And, brother, talk about payload! You can really pile the coal on a Dodge—thanks to its broad-shouldered frame, extra-sturdy axles, and better weight distribution!

So rely on powerful Dodge *"Job-Rated"* trucks for your toughest jobs. There's a model factory-engineered to meet *your* needs . . . to save you money . . . to last longer. Plan now to visit your nearby Dodge dealer—*soon*, for plenty of sensible ideas about hauling coal the *"Job-Rated"* way.

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THESE TWO
HYDRAULICALLY CONNECTED
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THE ANSWER TO YOUR TRIP MOVING PROBLEMS

This car spotter with its ease of installation and record of increased tonnage at inside loading points is also proving very desirable for permanent installations where its LOW INSTALLED COST and FREEDOM FROM MAINTENANCE are unequalled.



May we discuss its application to your needs.

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Gentlemen:

June 7, 1951

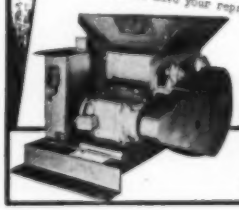
You can quote us as pleasantly surprised to find that the Gundlach Coal Crusher so far outdoes in actual performance the generous promises made by your representative.

The convenience of being able to reduce Mine Run to Stoker Coal in one handling operation in a single compact space-saving machine is paying us healthy dividends daily in savings of time and labor.

Our maintenance engineer reports that the easy accessibility of all bearings for lubrication and general maintenance is a definite economy factor. Out in the yard, the foreman has commented on the savings in time and handling through being able to change coal sizes without interrupting the crusher's operation. He draws attention as well to the very small percentage of waste. The Gundlach Crusher seems to do its job in a clean efficient manner, reducing wasteful pulverization to a minimum.

Please have your representative drop in on us on his next trip our way.

Very truly yours,



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BELLEVILLE, ILLINOIS

and wiring is indicated by the fact that in the last 3 yrs one mine has had three cutting machines completely burned out from that cause. In none of these, however, did a mine fire result.

Utility Line Protection

Adequate grounding, high standards of installation, strict control over fuse size and circuit-breaker settings, no temporary replacements or repairs and proper use of lighting arresters were some of the safety precautions emphasized by A. H. Jopp in his paper, "Grounding and Lightning Protection of Utilities Distribution Systems." Mr. Jopp, who is district commercial manager, Kentucky & West Virginia Power Co., Inc., said that the nationwide mining committee's recommendation for separate grounds for AC and DC systems and a separate ground for lightning arresters is not in accordance with the power-company practice. The latter ties everything at a substation to a common ground. He explained that lightning arresters usually will not withstand direct strikes, but that to have one destroyed in performing its function is well worth the cost, which is considerably less than that of the equipment protected.

New-Type Man-Trip Car

Travel time saving of 15 minutes per unit shift and safe transportation of the men resulted from installation of special man-cars, said Irvin I. Spotte, general superintendent, Princess Elkhorn Coal Co., David, Ky., in his paper, "Man-trip Cars For Low Coal." The cars were the alternative to spending $150,000 for a shaft, elevator, road and buildings to reduce travel time 20 min per shift, he pointed out. The cars, designed and built by Irwin Foundry & Mine Supply Co., are 28 ft long, 6 ft 3 in wide and only 24 in high. Four men ride in each of four compartments. One-half the compartment floor is raised on a 30-deg angle, and the men ride in a comfortable semi-reclining position on sponge rubber. The car top is covered with electrical insulation, and at each end of the car are separate compartments for tools and supplies. The cars are mounted on springs and are equipped with spring bumpers.

In an illustrated talk, "Mining of Contiguous Coal Measures," Charles T. Holland, head, Department of Mining Engineering, Virginia Polytechnic Institute, covered the same ground as in his articles recently published in *Coal Age* (August 1951, p. 89).

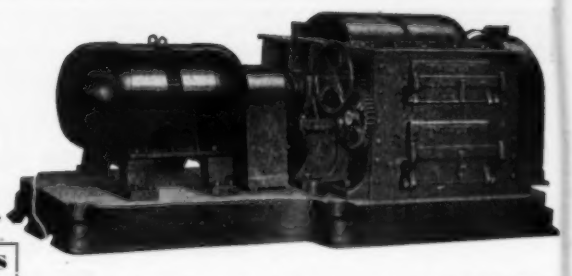
Stream-Pollution Problems

The problems of compliance with the standards to be announced by the Kentucky Water Pollution Control Commission under the 1951 act creating that commission, were discussed by Ernest M. Spokes, assistant professor, Department of Mining and Metallurgical Engineering, University of Kentucky. Acid neutralization, the most



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A REPORT FROM 29 COAL MINES AND POWER PLANTS

These significant facts are the result of a recent independent survey in which American Crusher users gave their reports—based on 61,161,372 tons of crushed coal:

(1) Total cost of operation of American Crushers was *less than 1c per ton.*

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(3) Average age of American Crushers at time of survey—9.35 years.

Conclusive proof that Americans are "built to take it"—built to produce year after year, ton after ton.

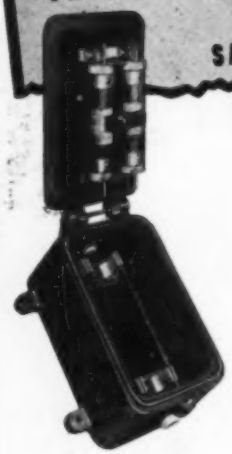
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RUBBER SEALED CASE...

The cast iron, RUBBER-SEALED case eliminates the hazards of coal dust and water seepage...yet is readily accessible. Unit is compact, only 12"x7"x4¾". Extra creepage insulation is provided by using ¾" mounting panel and large clearances to ground.

THE FUSES ARE SWITCH BLADES

The fuses are the switch blades and are the only parts that should need replacing. Other features include; Spring brass fuse support that gives a snap-type break when opened.... Copper supports hold blades in perfect alignment...Reinforced clips hold openend in line by grooved supports...Clamp type terminal in the center. One or two fuses may be used, capacities: 70-200 amps.

Also used as protective disconnecting switch for any motor in its range, or for feeder protection at night when trolley line switch is open.

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Backed by 25 Years Experience with Storage Battery Locomotives

THE GREENSBURG "CRUISER"

Operators say— "20% MORE EFFICIENT than average Storage Battery Locomotives"



All Locomotives CUSTOM-BUILT to your requirements

FEATURES

2-motor drive; total 24 h.p.

Series parallel controller.

Extra long journal springs for better trackability, roadability.

Oil-tight, leakproof transmission. Use auto oil, renew once every 6 months.

Adjustable Timken Roller Bearings throughout.

Strong. Simple construction. Low maintenance cost.

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Makers of Custom-Built Storage Battery Locomotives
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serious problem, up to the present time has no economic solution. Prof. Spokes, however, mentioned one case where reduction of discharge from mineworkings has been accomplished by sealing the surface with bentonite.

The removal of solids by settling ponds, thickening tanks, filter thickeners, flocculation aid, Driessen cyclone, Prinz "Streamcleaner" and froth flotation, was discussed by Prof. Spokes. In some cases, the value of the recoverable fuel may justify the expense of removing the solids from waste water. A laboratory at the university now is equipped for work in thickening, filtration and flotation.

Discussing stream pollution, Davis Read, consulting engineer, Chicago and Madisonville, Ky., said that an immediate practical problem is the discharge of acid from very large gob piles. He suggested the proper distribution and compacting of refuse to reduce porosity and promote better top run-off. Solids removal can be done but it calls for very elaborate mechanical equipment.

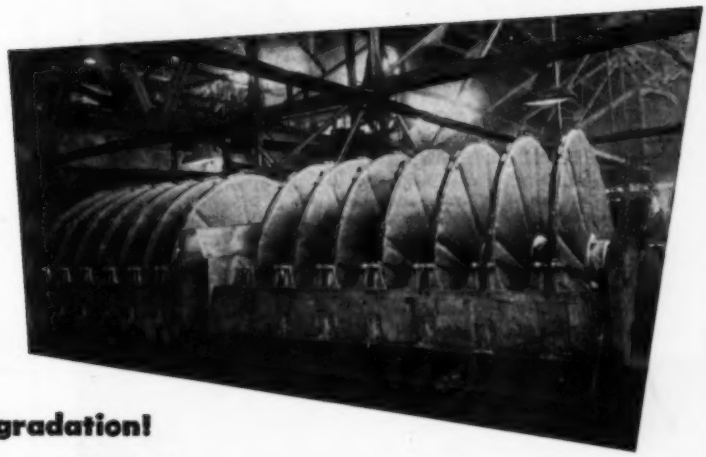
What the Consumer Wants

"Buying Coal on a Btu Basis—What the Consumer Wants," was the subject of a paper by Carroll F. Hardy, chief engineer, Appalachian Coals, Inc., Cincinnati. Purchasing agents, he said, are coming more and more to evaluating coal at least half way. that is on cost per million Btu. Some are evaluating it all of the way—including its performance throughout the plant, which involves unloading and handling cost, maintenance of plant equipment, slag and soot removal, ash disposal and perhaps the heat loss required to prevent air heater corrosion. In a certain plant, Mr. Hardy reported, Coal "B" showed a saving of $15,700 per year compared to Coal "A" when evaluated strictly on a Btu basis, but Coal "A" showed a saving of $8,006 per year over "B" when evaluation included all use factors throughout the plant.

Customers want consistency perhaps even more than they want good coal and the only way to meet this tendency is to get the best preparation possible every day of the week, Mr. Hardy said. Non-uniformity of preparation is more quickly noticed and creates more trouble in a small plant than in a large one because in the small plant inspection is largely on appearance, the car lasts longer and the man who unloads the coal and wheels out the ashes is sensitive to any deficiency or increase in ash. The trend toward closer evaluation of coal is likely to grow rather than diminish, Mr. Hardy stated.

Answering questions by Mr. Read, Mr. Hardy said that the new cyclone burners, although they have added flexibility, have definite limitations and cannot burn any kind of coal. They have proved to be critical of wet coal, size and ash fusion. Mr. Hardy emphasized that there is still a best coal for every type of burning.

DEWATERING FINE COAL



. . . without Degradation!

. . . with Clean Filtrate!

DO IT the American way. A play on words? Yes, but nowhere can you find a more effective, higher capacity unit for dewatering fine coal than the American Continuous Filter.

Better yet, nowhere can you find a unit which, considering the stream pollution problem confronting coal companies, will do what a real dewaterer is supposed to do: separate solids from liquids without letting the solids through in damaging percentages. Filtrate from the American Filter handling fine coal (⅛" and under) carries on the average less than 1% solids.

And best of all — you will find that all this effective dewatering takes place *without any degradation of product.* The coal is handled gently.

Bring your fines dewatering problem to Oliver United. We have laboratory facilities and field test units for determining the best filter station. And we have several types of dewaterers to complement the American where sizes are such as to call for a different filter.

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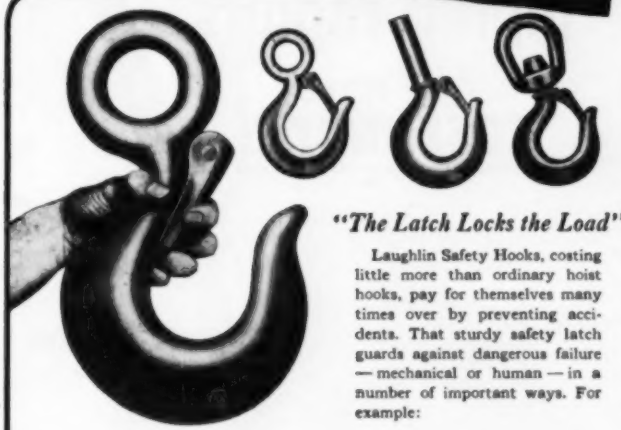
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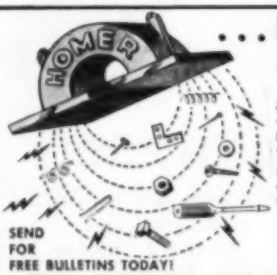
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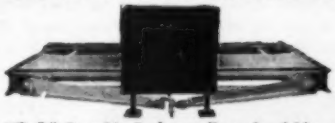
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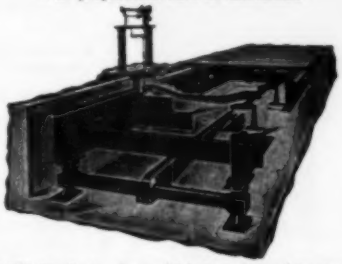
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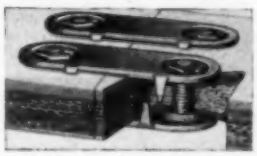
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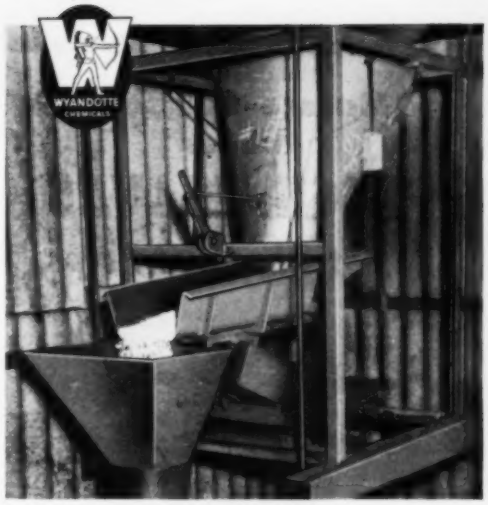


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	3% Surface Moisture	6% Surface Moisture	9% Surface Moisture
+32 to +15	3.0 to 4.5	6.0 to 9.0	9.0 to 13.5
+15 to 0	4.5 to 6.0	9.0 to 12.0	13.5 to 18.0
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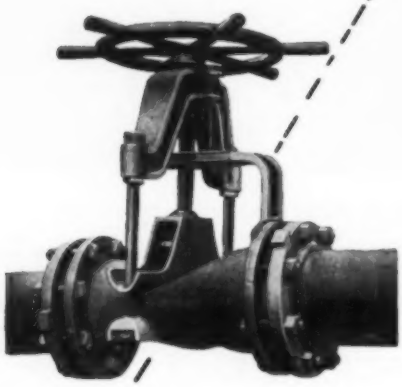
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FOR SALE
4—35B Jeffrey Machines

MERRICK COAL CO.
Waynesburg, Ohio Phone 2151

WANTED

Coal washer, prefer Jeffrey unit type jig washer capacity, 60 to 100 tons per hour.

Allison Engineering Company
Route 8 and Bunchfield Road
Allison Park, Pennsylvania

FOR SALE

MOTOR GENERATOR SETS

1—200 KW Ridgeway MG set, 2300 V. A.C., 250-275 V. D.C., 1200 RPM, complete with switchboard.

2—150 KW G. E. MG sets, 2300 V. A.C., 250-275 V. D.C., 1200 RPM, with automatic circuit breaker.

1—90 KW G. E. MG set, 2300 V. A.C., 250 V. D.C., 1200 RPM, complete with switchboard.

1—75 KW Westinghouse MG set, 250 V. D.C., 220 V. A.C., complete with switchboard.

MINING MACHINES

7—512 EJH Goodman DC shortwall mining machines, complete with bug dusters, hydraulic control, 8½' cutter bars, cables, and Joy T1 cat trucks. Serial numbers: 8909, 8910, 8911, 8864, 8865, 8935, 8934; (like new).

2—512-DG3A Goodman shortwall mining machines, AC, 8½' cutter bars complete with cable. With Joy T1-4G cat trucks.

2—512-EL3 Goodman shortwall mining machines, AC, 7' cutter bars, complete with Joy T1-4G cat trucks and cables.

3—Sullivan CLE5 longwall mining machines, 3/60/220 volts, with 4½' cutter bars.

2—12AA Goodman AC, 50 HP, standard shortwall mining machines. (With or without trucks.)

4—Jeffrey 29U, 250 Volts, DC, 48" gauge cutting machines, 9' cutter bars.

CRUSHERS

1—36 x 36 Jeffrey single roll crusher.

1—26 x 60 Link Belt double roll crusher.

1—24 x 48 McNally Pittsburgh double roll crusher.

1—30 x 36 United Iron Works single roll crusher.

1—24 x 24 Hercules single roll crusher.

1—24 x 24 Webster single roll crusher.

1—24 x 24 Stephens Adamson single roll crusher.

1—12 x 16 Eagle Iron Works double roll chipper, complete with hopper and 7½ HP AC motor, (Mounted on one base. Like new).

1—48" McNally Pittsburgh Vertical Pick Breaker.

2—American Pulveriser Company Ring Roll crushers.

COPPER

Several thousand feet of #6, 3/C, 5,000 volts lead covered armored cable.

Several thousand feet of 6/0, figure 8, trolley wire in long lengths.

Several thousand feet 1,000,000 C.M. stranded weatherproof copper wire.

LOCOMOTIVES (Ball Bearing)

	Make	Type	Gauge
1—	20 ton Goodman	36-AO4T	42"
1—	15 ton Jeffrey	MH110	42"
1—	10 ton Jeffrey	MH110	42"
3—	8 ton Goodman	32AO4T	36"
1—	8 ton Goodman	32AO4T	42"
1—	8 ton Westinghouse	4-2-35-C-437	36"
6—	6 ton G.E.	HM 821A	42"
1—	6 ton G.E.	HM 708B	42"
1—	6 ton Jeffrey	MH 64	42"
1—	4 ton Goodman	42-1-4-T	36"

HOPPER CARS

22—15 ton Sanford Day automatic drop bottom cars with multiple latch arch bar truck, 4 wheels under each end, 18" wheels, 36" gauge, Sanford Day roller bearing trucks. Overall dimensions: Overall length over bumpers 25'2"; Overall length inside 20'11½"; Overall width 6'10⅝"; Overall height 6'6". Size of door: Width 2'9". Length both doors 11'9½".

RAILS

Approximately 100 tons used 16# rails, random lengths.

Several hundred tons of rails, 56# and up, suitable for roof bars, random lengths from 8½' and up.

We carry splices, angle bars, track bolts, and track spikes in stock.

VIBRATORS

1—48" x 102" style C-700, Robbins Gyrex double deck.

1—Stephens Adamson two deck vibrator, size 4' x 10'.

4—Robbins Gyrex 4 x 10 two and one-half deck vibrators. (like new).

4—Tyler 400 Electric Screens, (like new).

JOY LOADERS

4—8BU DC Joy Loaders.

CAR SHAKEOUT

1—Robbins New HD Car Shakeout, with 20 HP AC motor complete with 1 new Robbins and Myers type F-3-Z twin-hook electric hoist, remote control complete.

SHUTTLE CARS

1—Jeffrey 32" shuttle car, (like new—used approximately 30 days).

CONTINUOUS MINERS

1—4 JCM-1E Joy CM 250 volts DC, type JM-109R.

1—4 JCM-1AE Joy CM 250 volts DC, type JM-120.

We also carry a complete line of conveyors of all sizes, together with fans, feeders, hoists, electric motors both AC and DC, speed reducers, transformers, etc.

We appreciate your inquiries.

GAVENDA BROTHERS, Inc.

CANTON, ILLINOIS

MINE AND SLOPE HOISTS

3—12,000# Wellman Sgl Drum 4'x5'F Hoists with 150 HP motors, starters, safety control, 250 V DC.
1—10,000# Clyde DC
1—26,000# Nordberg Sgl Drum
1—11,000# Wellman Sgl Drum AC
1— 7,000# Ottumwa Sgl Drum AC

CARPULLERS AND LOADERS

1—10,000# Link Belt Capstan Carspotter new
1— 5,000# Jeffrey Carspotter AC
1— 5,000# Link Belt Carspotter AC
1—20,000# Amer. Hoist Carspotter AC
1—20,000# LB Endless puller

CRUSHERS AND MISC.

140—90CFT ACF Mine Cars with Timken Bearings, 36 & 42" gauge. Good condition, Bargain
1—36x36 Jeffrey Sgl Roll
1—12x16 Eagle Dbl Roll
1—18x20 Eagle Dbl Roll
1—420' x 20" SA Comb. Scraper & Bucket Conveyor w/o Mtr. Ideal for tipple or deck.
2—24"x60' SA Porta. conveyors, AC mt'r
1—(New) Nolan porta. feeder
1—22x66" 5D-RS Roots Connersville Positive Pres. Blower output 45 CF per. Rev. Complete with 100 HP AC Mtr and controls.
1—75'x28'x30' high steel building.

HAWKINS & CO.

154 So. Michigan Ave., Chicago 3, Ill.
Telephone Harrison 7-0725

MOTOR GENERATORS

1—300 KW G. E. Syn. 275 V. 1200 RPM
1—300 KW WEST. Syn. 275 V. 1200 RPM
1—200 KW G. E. Syn. 275 V. 1200 RPM
1—200 KW RIDGWAY Syn. 275 V. 900 RPM
1—150 KW WEST. Syn. 275 V. 1200 RPM
1—100 KW RIDGWAY Syn. 275 V. 1200 RPM
2— 50 KW G. E. fed. 275 V. 1200 RPM

ROTARY CONVERTERS

2—300 KW WEST. Syn. 275 V. 1200 RPM 6 Ph., 60 Cy. Transformers
1—200 KW West. Syn. 275 V. 1200 RPM 6 Ph., 60 Cy. Transformers
2—200 KW Al-Ch Syn. 275 V. 1200 RPM 6 Ph., 60 Cy. Transformers
1—150 KW G. E. Syn. 275 V. 1200 RPM HCC. 6 Ph., 60 Cy. Transformers
2—100 KW G. E. Syn. 275 V. 1200 RPM 6 Ph., 60 Cy. Transformers

ARMATURES

1—900 KW G. E. 275 V. MPC Gen. 900 RPM
1—600 KW G. E. 575 V. HCC Conv. 1200 RPM

LOCOMOTIVES

2—30 T JEFFREY 230 V. 2-MH-77 48-36" Ga.
1—25 T G. E. 500/250 V. 2-MH-824-A 44-36" Ga.
1—20 T JEFFREY 250 V. MH-77 48-36" Ga.
1—20 T G. E. 250 V. (Tandem) HM 809 36" Ga.
1—13 T JEFFREY 250 V. MH-2110 42-36" Ga.
1—13 T JEFFREY 500 V. MH-110 44-36" Ga.
1—10 T JEFFREY 250 V. MH-2110 40-36" Ga.
2—10 T JEFFREY 250 V. MH-110 42-36" Ga.
1—10 T WEST. 250 V. ML-907-C 36" Ga.
2—10 T GOODMAN 250 V. 36-B 36" Ga.
6—8 T JEFFREY 250 V. MH-110 42-36" Ga.
2—8 T WEST. 250 V. ML-906-C 44-36" Ga.
4—8 T JEFFREY 250 V. MH-88 44-36" Ga.
1—6 T G. E. 250 V. HM-823 42-36" Ga.
2—4 T WEST. 250 V. ML-901-C 24" Ga.
2—4 T GOODMAN 250 V. MG-4-E 36-24" Ga.

LOCOMOTIVE MOTORS

2—JEFFREY 250 V. MH-77, Ball Bearing
2—WEST. 250 V. ML-906-C, Ball Bearing
2—WEST. 250 V. ML-904-R, Ball Bearing
3—WEST. 250 V. ML-901-C, Ball Bearing
2—G.E. 500/250 V. HM-824-A, Ball Bearing
3—G.E. 85/125 V. HM-828-A, Ball Bearing
4—WEST. 80 V. V-49-X, Ball Bearing

Extra Armatures Available for above motors.

WALLACE E. KIRK COMPANY

501 GRANT BUILDING — PITTSBURGH 19, PENNSYLVANIA

COMPLETE BELT CONVEYORS AND CONVEYOR BELTING

COMPLETE ELEVATORS · DRAG CONVEYORS · PAN & RECIPROCATING FEEDERS

ELEVATOR BUCKETS — WRITE FOR LITERATURE — CONVEYOR PULLEYS

IMMEDIATE DELIVERY — REDUCED PRICES

FRANK A. KREMSER AND SONS, INC.

3435-45 N. 5th STREET
PHILADELPHIA 40, PENNA.

REgent 9-7272 REgent 9-7524

CRUSHERS — VIBRATING & SHAKER SCREENS — CONVEYORS — PICKING TABLES — IDLERS FEEDERS — CONVEYOR PARTS — SCALES

COAL CRUSHERS

Double and single roll models. Types to produce ¾" stoker and others to crush up to 8" resultant. Capacities from 15 to 500 tons per hour. Steel hoppers included.
Priced from $479.00

HEAVY DUTY PLATE AND PAN FEEDERS

Complete with motor and drive.
15 to 25 ton per hour capacity $423.00
28 to 30 ton per hour capacity 552.00
50 to 100 ton per hour capacity 1437.00
100 to 175 ton per hour capacity 1933.00

TRUCK SCALES

15 ton Truck Scales $545.00
20 ton Truck Scales 617.00
30 ton Truck Scales 684.00

MINE CAR AND TIPPLE SCALES

Single and double track platforms. Capacities 5 to 20 tons.
Priced from $377.00

SAVE! BUILD YOUR OWN CONVEYOR!

We have in stock standard sections, head and tail pulleys, screw takeups, gravity takeups, troughing and picking idlers, return rollers, belting, drives, speed reducers, sheaves, motors, etc. Phone us your order.

HEAVY DUTY FLIGHT CONVEYORS

Any length. Flights up to 8" x 24". All welded structural and sheet steel. Heavy duty, double guided chain.
Priced from $571.00

VIBRATING SCREENS

Eccentric weight types. Several in stock from 2' x 4' to 3½' x 8'.
Priced with cloth from $479.00
Heavy duty eccentric shaft types. A few on hand, in excellent condition. Sizes 3' x 8' to 5' x 14'. One to 5 decks.
Priced with cloth from $1573.00

PORTABLE FLIGHT CONVEYORS

Mounted on rubber tires and adjustable undercarriage. All welded structural and sheet steel; double guided heavy duty chain; steel flights, 3" x 12". Electric or gasoline power.
Priced from $558.00

CONVEYORS — PICKING TABLES

Troughing idler conveyors—picking tables. Any length. Belt widths to 60".
Priced from $435.00

TROUGHING IDLERS AND ROLLERS

All steel. Interchangeable with other well-known makes. Replaceable precision ball bearings. No bearing adjustments required. Easy to start and will run in cold weather. Rust-proof ball races; maintenance is negligible.
3-roll Troughing Idlers for these sizes:

14" belt	$22.00	24" belt	$25.00
16" belt	23.00	30" belt	26.90
18" belt	24.00	36" belt	27.00
	42" belt	$28.00	

1-roll Return Idlers for these sizes:

24" belt	$10.00	36" belt	$11.50
30" belt	11.00	42" belt	12.50
	48" belt	$13.50	

GUARANTEED EQUIPMENT — IMMEDIATE SHIPMENT

BONDED SCALE & MACHINE COMPANY

2190 S. Third Street — Columbus 7, Ohio

PHONES: GArfield 2186; FRanklin 6-8898, Evenings

250 H.P. 2-COMPARTMENT VULCAN SHAFT HOIST



READY FOR IMMEDIATE DELIVERY

578' max. shaft depth
10,500 rope pull
1260 f.p.m. rope speed

2-rope cylindro-conical drum is grooved for 1¼" rope. Motor is 250 H.P., 2200 volt -3-60. Lilly safety controller, hydraulic post brakes, herring-bone gears.

Conical drum feature reduces electric power peaks and starting torques.

WRITE FOR COMPLETE SPECIFICATIONS

ROGER PIERCE EQUIPMENT SALES CO.
808 Newhouse Bldg.
Salt Lake City, Utah
Phone 33983

TRANSFORMERS FOR SALE

1 Phase, 60 Cycle

3—500 KVA G-E 66000—2300
2—500 KVA W-H 13200—240/480
3—400 KVA W-H 13200—600/575/550
1—400 KVA G-E 13200—120/240 Pyranol
3—333 KVA G-E 44000—6600
3—250 KVA W-H 13800—2300
3—200 KVA G-E 13200—120/240
3—250 KVA Kuhl 6600—575
3—150 KVA G-E 44000/33000—2400/500
3—150 KVA Pitts 22500—575
3—150 KVA G-E 19050/33000Y—2540/2300
3—150 KVA A-Ch 13800—2300
3—100 KVA G-E 33000—6900/11950Y
3— 50 KVA G-E 33000—2400/4160Y
3—100 KVA G-E 2400—240/480, 25 cycle

Many other items in stock

TRANSFORMERS WANTED

Reliable rewind and repair service on all makes of transformers

THE ELECTRIC SERVICE CO.

CINCINNATI 27, Ohio

SHOVELS

SUBJECT TO PRIOR DISPOSITION

Bucyrus-Erie 54-B Standard Shovel with 26 ft. boom, 18 ft. dipper handle, 2¼ cu. yd. bucket. Powered by Buda Diesel. This machine has been completely overhauled, and is ready to go. Location, Woodbridge, N.J.

Lima Type 1201 Loading Shovel, 20 ft. boom, 24 ft. dipper stick, 3¼ cu. yd. dipper. Powered by Cummins Diesel. Location Mountain Iron, Minnesota.

111 M Marion Standard Shovel Attachment, 30 ft. boom, 23'8" Stick, 3¼ yd. Manganese Bucket. This item is brand new. Located in Johnstown, Pa. Immediate delivery at considerable less than replacement cost.

1—Bucyrus-Erie 5-B Hi-Lift Shovel Front with 45' Boom, 32' Tubular Steel Handle and ten c.y. Dipper. Location Johnstown, Pa.

High Shovel Front for Lima 1201 with 42 ft. boom, 22 ft. dipper stick and 2 cu. yd. bucket. Complete with laggings etc. Now in 1947. Available immediately.

We also have several Hi-front Shovel attachments for Lima Model 1201 machines.

WILL CONSIDER RENTAL

S.J. GROVES AND SONS COMPANY

19 Rector Street, New York, N.Y.
WHitehall 3-1055

COAL CUTTER: Goodman 212G3, low vein.

LOCOMOTIVE: Goodman 3304T Haulage, 6 ton, 250 volt, 36" Gauge.

HOIST: Lidgerwood, single drum, electric.

Guaranteed rebuilt, attractive price.

Also Coal Crushers, Conveyors of all types, Electric Motors, etc.

The Industrial Equipment Corp.

910 First National Bank Bldg.
Pittsburgh 22, Pa. — Atlantic 1-2929

C. B. LOCKE CO.

308 Tennessee Ave. — Phone 3-8136
Charleston 32, W. Va.

SUBSTATIONS—SWITCHBOARDS—MOTORS
TRANSFORMERS

FOR SALE

MARION 111-M Long Range Stripping Shovel. 3 cu. yd. Dipper — — 42'-0" boom. GM Twin 6-71 Diesel power with Ward-Leonard Electric swing. In excellent condition, being sold as a result of a changing operation. Located Eastern Ohio. Available immediately.

Marion Power Shovel Co.
Marion, Ohio

TRANSFORMERS

STOCK SHIPMENT
1 KVA—7500 KVA

— SPECIAL —
100 15 KVA Air 440/220-110/220

CASH FOR YOUR SURPLUS

ELECTRIC EQUIPMENT CO.

P. O. Box 51, Rochester, N.Y.
WORLD'S LARGEST INVENTORY
MOTORS - GENERATORS - TRANSFORMERS

CARLYLE
INDUSTRIAL RUBBER PRODUCTS FOR EVERY PURPOSE

IMMEDIATE DELIVERY OF CONVEYOR, ELEVATOR AND TRANSMISSION BELTING — FIRE, WATER, SUCTION, AIR, STEAM AND OFFICE HOSE

WHY WAIT

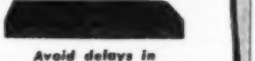
We have 8 to 48

RUBBER CONVEYOR BELTING

TOUGH COVERS—Heavy duty, specially compounded abrasive resistant rubber covers having high tensile strength. Thoroughly capable of withstanding the abrasive action of bulk materials. Properly vulconized to the carcass to assure utmost performance, economically.

STRONG CARCASS—Constructed of finest quality 28 and 32 ounce tough cotton duck, properly treated and impregnated to avoid mildew from moisture and atmospheric conditions. Each ply thoroughly embedded in rubber to prevent ply separation.

FLEXIBILITY — Careful attention has been given in the construction of all belts to have the proper flexibility assuring the following desirable features: troughs easily, runs true on all idlers, gouge resistant, excellent for long and short hauls and slope installations.



Avoid delays in your production schedules!

We carry in stock for your immediate requirements, Conveyor Belting in widths from 8 inches to 48 inches.

Width	Ply	Thickness Top Cover	Thickness Bottom Cover	Type of Duck Carcass
8"	4	1/16"	1/32"	28 Oz.
10"	4	1/16"	1/32"	28 Oz.
12"	4	1/16"	1/32"	28 Oz.
14"	4	1/16"	1/32"	28 Oz.
16"	4	1/8"	1/32"	28 Oz.
18"	4	1/8"	1/32"	28 Oz.
20"	4	1/8"	1/32"	28 Oz.
20"	5	1/8"	1/32"	28 Oz.
24"	4	1/8"	1/32"	28 Oz.
24"	5	1/8"	1/32"	28 Oz.
26"	5	1/8"	1/32"	28 Oz.
30"	4	1/8"	1/16"	32 Oz.
30"	5	1/8"	1/16"	32 Oz.
30"	6	1/8"	1/16"	32 Oz.
36"	6	1/8"	1/16"	32 Oz.
42"	5	1/8"	1/16"	32 Oz.
48"	5	1/8"	1/16"	32 Oz.
48"	8	1/8"	1/16"	32 Oz.

INQUIRE FOR SIZES NOT LISTED.
ELEVATOR TRANSMISSION & V-BELTING ALSO IN STOCK.

All our belting made by the leading belting manufacturers.

Write for Free Booklet on Installation, Care & Maintenance of Conveyor Belting.

SEND US YOUR INQUIRIES FOR OTHER RUBBER PRODUCTS

CARLYLE RUBBER CO., Inc.
62-66 Park Place, New York 7, N. Y.
Phone: Digby 9-3810

For Sale
ROTARY CONVERTERS
Used & Rebuilt

All sizes usually in stock, and can usually be furnished to meet any primary AC voltage.

A late type converter, ready to go:

1—200 Kw Westinghouse Synchronous Rotary Converter, 275 volts DC, compound wound, interpole, 1200 rpm., 6 phase, 60 cycle, pedestal type. (Compare with NEW but price of rebuilt.) Complete with 2300/4000Y volt transformers and AC-DC switchboards.

Other sizes also in stock; can furnish from 100 to 1000 kw, 275 or 550 volts DC.

R. H. Benney Equipment Co.
5024 Montgomery Road, Cincinnati 12, Ohio
Phone: MElrose 1108

LOCOMOTIVES, 250 VOLT DC, BALLBEARING

2—20-ton Jeffrey MH-77
5—15-ton Jeffrey MH-110
2—13-ton Jeffrey MH-110
1—10-ton Jeffrey MH-110
4—10-ton Goodman 34-B
12—8-ton Jeffrey MH-100 with reels
3—8-ton G.E. HM-819 with reels
4—8-ton Westinghouse 905-C with reels
2—8-ton G.E. HM-834 with reels
15—6-ton Jeffrey MH-80 with reels
4—6-ton G.E. HM-801 with reels

Complete with new Jeffrey steel strip resistances.
All have been rebuilt and any part showing any wear was replaced with new.



Sheldon J. Wolfe Frank J. Wolfe

LOADING MACHINES, 250 VOLT DC

5—1 BU-7RBE Joy Loading Machines, permissible construction with permissible plate, equipped with 10 HP gathering head motors, 7½ HP traction motors and 2 HP hydraulic pump motor.
6—14BU-3PE Joy, low pedestal type; 6—8-BU Joy; 5—11-BU Joy; 5—460 Goodman; 3—360 Goodman; 4—260 Goodman; 5—L-500 Jeffrey; 2—L-500 Jeffrey; 2—Myers-Whaley No. 3 Automats, practically new.

STEEL MINE CARS, LOW VEIN TYPE

500—Watt Car and Wheel Company Rotary Dump Mine Cars, 42" TG, 3-ton capacity, height 30", overall length 10'7", inside length 9', width overall 66", 14" Timken roller bearing wheels, 3½" axles, 32" wheel base. These Cars are in excellent condition. Also have Rotary Dumps for them and blueprints. Bargain for quick sale.

We also have other lots of 150 to 300 Rotary Dump and Drop Bottom, 42" TG Mine Cars, 3-, 4-, and 5-ton capacity. Please mail us your inquiries for any Cars you might need.

SHUTTLE CARS, CABLE REEL TYPE, 250 VOLT DC

4—Joy 42E-16AX
3—Joy 42E-13X
8—Lee-Norse Koal-Mobile, Type KMC43B, 4-wheel drive, 33" high
12—Lee-Norse Koal-Mobile, Type KMC46B-5
10—Joy Type 42D3 with practically new batteries
10—Joy 65C Cable Reel Shuttle Cars with adjustable discharge, 34" basic height with 6" removable sideboards, 4-wheel drive, 4-wheel hydraulic steering with hydraulic cable reel.

MOTOR GENERATOR SETS—2300/4000 VOLT

1—300 KW Westinghouse, 275 V 1200 RPM, full automatic switchgear
4—200 KW G.E., 275 V 1200 RPM, full automatic switchgear
3—150 KW G.E., 275 V 1200 RPM, manual switchgear

ROTARY CONVERTERS—TYPE HCC-6, 2300/4000

1—300 KW G.E. 275 V 1200 RPM
1—250 KW Westinghouse 275 V 1200 RPM
4—200 KW G.E. 275 V 1200 RPM
1—100 KW G.E. 275 V 1200 RPM
All complete with switchboards, transformers and all necessary appurtenances.

DC CUTTING MACHINES — 250 VOLT

4—Jeffrey 29-U; 3—Jeffrey 29-LE; 10—Jeffrey 35-BB
8—Sullivan 7-B on Joy cats; 6—Goodman 812 on Joy cats
13—Goodman 12-AA; 15—Goodman 112-AA
5—11-BU Joy-Sullivan Pneumatic Tired, Mounted Coal Cutting Machines, height, 31", width 83", cutter bar 9' piped for spraying water. Solid bearing cutter head. Kerf thickness 6". 30 HP cutting motor. 26 HP Hydraulic pump motor controls, permissible type provided on each side of machine.

AC CUTTING MACHINES—220/440 VOLT

2—Jeffrey 29-U; 3—Jeffrey 35-BB; 1—Jeffrey 35-L
1—Jeffrey 24-B; 1—Goodman Universal; 5—Goodman 12G3
5—Goodman 112G3; 4—Goodman 112G3A; 2—Goodman 112GD3A

STEEL TIPPLES AND WASHERS

Several 4-, 5-, and 6-track late type steel Tipples; also Link-Belt, McNally-Norton, and Heavy Media Coal Washers with capacities of 100, 200 and 300 tons per hour; and two McNally-Norton Unit Washers of 100 tons per hour capacity.

ELECTRIC HOISTS

We have all types of Hoists from 100 HP to 1500 HP, suitable for slope, shaft or drift mines. Complete specifications on request. Send us your inquiries.

A WORLD OF OTHER EQUIPMENT TO OFFER — LET US KNOW YOUR REQUIREMENTS.

WE SPECIALIZE IN BUYING OUTRIGHT COMPLETE MINES THAT ARE GOING OUT OF BUSINESS OR FROM RECEIVERS IN BANKRUPTCY, ADMINISTRATORS OF ESTATES, ETC.

COAL MINE EQUIPMENT SALES COMPANY

FRANK J. WOLFE — SINCE 1912 — SHELDON J. WOLFE
306-307 BEASLEY BUILDING • LONG DISTANCE PHONE 34 • TERRE HAUTE, INDIANA

2—7 ton General Electric Battery Locomotives, 36" gauge, permissible type
2—8 ton General Electric Battery Locomotives, 36" gauge
4—10 ton Atlas Battery Locomotives, 36" gauge.
1—6 ton Goodman Trolley Locomotive, 36" gauge.
2—8 Ton Goodman Battery Locomotives, 36" gauge
2—5 Ton Mancha Battery Locomotives, 36" gauge
2—8 Ton Goodman Trolley Locomotives, 36" gauge
1—5 Ton Jeffrey Trolley Locomotive, 36" gauge
2—8 BU Joy Loaders
2—61 EW Jeffrey Elevating Conveyors
1—61 HG Jeffrey Chain Conveyor, 90'
2—61 W Jeffrey Chain Conveyors, 200'
1—Northern Portable Coal Unloader Conveyor, 14" x 14'6"
1—Farquahar Portable Coal Unloader Conveyor, 18" x 18'
2—Chicago Portable Load Loaders, 14" x 36'
1—7000± H. & B. Single Drum Electric Hoist.
1—7000± Vulcan Single Drum Electric (or steam) Hoist.
1—150 HP Vulcan Single Drum Electric Hoist.
30—Type HS New American Blowers, 12000 CFM, direct driven by variable speed Wagner motors with controllers, for either 440 V., 250 or 125 Volt DC.
1—42-H Jeffrey "Aerodyne" 42" Fan.
1—74 KW D-13000 Caterpillar Diesel Electric Generating Unit.
1—40 KW Imperial Motor-Generator Set, 250 Volt.
1—165 KW General Electric Motor-Generator Set, 600 Volt.
1—18" x 18" McNally-Pittsburg Double Roll Coal Crusher.
Relaying rail and track accessories.
12—Chicago-Pneumatic Permissible Coal Drills, 440 V
8—Goodman G 20 Shaker Conveyors
1—G 15 Goodman Shaker Conveyor
4—Vulcan Shaker Conveyors
8—Brown-Fayro Permissible Blower Fans
10—Goodman HA Duckbills
13—CE 7 Sullivan Mining Machines
2—7B Sullivan Mining Machines
2—CR3 Sullivan Mining Machines
125—Card Steel Mine Cars, 36" gauge
1—150 Tons Per Hour Complete Tipple with screens, picking booms, box car loaders, oil and chemical treating equipment and magnetic tramp iron separator.
1—375 HP Box single drum hoist complete with motor and panel.

We have just purchased 3 coal mines and have complete equipment of all types for coal mining purposes. The above is but a partial list of what we have available. Send us your inquiries for any mining or electrical equipment needed.

Write for Bulletin 521-C giving complete listing of our large stock of dependable reconditioned machinery for Mining, Industrial, Electrical and Construction uses.

MORSE BROS. MACHINERY CO.

2900 Brighton Blvd. — Est. 1898 — Denver 1, Colo.

1—24 x 24 Jeffrey Sgl. Roll Coal Crusher
1—36" American Ring Type Coal Crusher
4—#18 Spec. 6-cell Denver "Sub-A" Flot Machines, steel tanks
1—#24 8-cell Denver "Sub-A" Flot Machine, wood tank
1—4' x 4' Denver Conditioner, steel tank
1—16' x 8' Denver Thickener, steel tank
1—4' x 3' Denver Drum Filter with Vac. Equip.
1—207 HP 3-cyl. Fairbanks Full Diesel, direct connected to a 125 KVA AC Generator, with softeners, starting equip. etc.
2—200 amp. Lincoln Arc Welders
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1—12 cu. yd. Steel Hopper Bin on Legs
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1—Bucket Elev. 45' centers, 10 x 6 Mall. Buckets, on steel frame
2—Bucket Elevs. 30' centers, steel housed
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1—18" Belt Conveyor on steel channels, 20' centers
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300	Cr. Wh.	290	2200
200	West.	500	220/440
200	West.	500	2200
150	G. E.	600	2200
150	West.	870	2200
150	West.	870	220/440
100	Triumph	880	550/440/220
75	G. E.	600	550/440/220
75/100	West.	290/580	2300
75	G. E.	720	220/440
60	G. E.	570	220/440

230 VOLT DC MOTORS

HP	MAKE	TYPE	RPM
600	Cr. Wh.	CCM	330/330
400	Cr. Wh.	CCD	200
400	West.	———	300
160	Cr. Wh.	CMC	1200
120	G. E.	DMC	300/700
100	West.	SK-190	880
100	West.	SK-142L	1700
60	West.	SK-153	850
60	West.	SK-123L	1750
50	Cr. Wh.	CMC	700
50	West.	SK-150	790

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150 KW. Crocker Wheeler, 250 V. DC, 1750 RPM, 2300 or 220/440 Volt Ind.
100 Kw, Hobart, 250 Volt, 2200 Volt, 3 Phase, 60 Cycle, 1750 RPM Ind.
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1 6 ton Jeffrey Locomotive 550 v. 42" ga.

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KW	MAKE	TYPE	RPM
600	Cr. Wh.	CCM	375
275	West.	———	480
150	Burke	B-70	900
150	Cr. Wh.	CMC	1450
100	West.	SK-190	720
100	Al. Chal.	———	275
100	Delco	120/240	1200
75	West.	SA	790
60	West.	———	875
60	West.	SK	1150
50	West.	SK-150	1150

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300 KW Ridg. 275 v. 1200R-Syn. 2300
300 KW West. 550 v., 1200R-Syn.-SK 2300
200 KW West. 275 v. 1200R-SK-CW 2300
200 KW Ridg. 275 v. 900R-Syn. 2300
150 KW West. 275 v. 1200R-Syn.-SK 2300
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HP	MAKE	SPEED	TYPE	WDG.
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300	G.E.	450	IN	S.R.
160	G.E.	600	IK	S.C.
150	G.E.	600	ATI	Syn.
2—100	G.E.	450	IN	S.R.
100	Al.-Ch.	720	ARX	S.C.
100	West.	900		Syn.
100	West.	1200	CS	S.C.
75	G.E.	600	ITC	S.R.
75	West.	900	CS	S.C.
40	G.E.	900	WT	S.R.

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COAL AGE ADVERTISERS IN THIS ISSUE

MORE INFORMATION on any product advertised in COAL AGE may be easily secured by using the postage-free card facing p. 125.

*Allis-Chalmers Mfg. Co. 49
*Allis-Chalmers Tractor Div. 8-9
*American Brattice Cloth Corp. 170
American Cable Div.,
American Chain & Cable Co. ..... Third Cover
American Car & Foundry Co. ..... Second Cover
*American Manganese Steel Div.,
American Brake Shoe Co. 35
*American Pulverizer Co. 179
*American Steel & Wire Co. 61
Anaconda Wire & Cable Co. 17
Ashland Oil & Refining Co. 140
*Atlas Car & Mfg. Co. 154
Atlas Powder Co. 48
Aurora Pump Co. 184

Baker Mfg. Co. 152
*Bemis Bro. Bag Co. 173
*Bethlehem Steel Co. 22, 30, 36
Bird Machine Co. 4
*Bixby-Zimmer Engrg. Co. 123
Boston Woven Hose & Rubber Co. 42
*Bowdil Co. 59
Bucyrus-Erie Co. 58

Cardox Corp. 64-65
*Carlon Products Corp. 44
Caterpillar Tractor Co. 30
Central Mine Equipment Co. 171
Cheatham Electric Switching Device Co. 186
*Chicago Pneumatic Tool Co. 36A
*Cincinnati Mine Machinery Co. 21
Cities Service Oil Co. 57
Coal Operators Casualty Co. 182
*Colorado Fuel & Iron Co. 26
*Columbia-Geneva Steel Div. 61
*Crane Co. 184
Crescent Belt Fastener Co. 168
*Cummins Engine Co. 157

*Denver Equipment Co. 40
Detroit Diesel Engine Div., General Motors 132
*Differential Steel Car Co. 161
Dodge Div., Chrysler Corp. 177
Dodge Mfg. Corp. 54
Duff-Norton Mfg. Co. 122
duPont de Nemours & Co., E. I.
(Explosives Dept.) 159
Durakool, Inc. 166

Eaton Mfg. Co. ..... Insert between pp. 36-37
*Eimco Corp. 16
*Electric Storage Battery Co. 111
Elreco Corp. 124
*Ensign-Bickford Co. 68

*Fairmont Machinery Co. 43
Farmers Engrg. & Mfg. Co. 154
Firestone Tire & Rubber Co. 67
Flexible Steel Lacing Co. 185
*Flood City Brass & Electric Co. 180

*Gates Rubber Co. 29
*General Electric Co. 14-15, 46, 60
Glosser & Sons, Inc., M. 158
Goodman Mfg. Co. 63
Goodrich Co., B. F. 1, 113
Goodyear Tire & Rubber Co. 23, 31
Gould National Batteries, Inc. 137
Greensburg Machine Co. 180
Gulf Oil Corp. 45
Gulf Refining Corp. 65
Gundlach Machine Co., T. J. 178
Guyan Machinery Co. 166

*Hazard Insulated Wire Works 165
Harnischfeger Corp. 38
*Hendrick Mfg. Co. 176
Hercules Powder Co. 28
Hewitt-Rubber of Buffalo,
Div. of Hewitt-Robins, Inc. 32-33
Hoffman Bros. Drilling Co. 189
*Holmes & Bros., Inc., Robt. 66
Homer Mfg. Co. 186
Hulburt Oil & Grease Co. 2-3

Indiana Bearings, Inc. 121
*Indiana Foundry Co. 184
International Harvester Co. 133

*Jeffrey Mfg. Co. 10-11
Jenkins Bros. 115
Johnson Plastic Corp. 150
*Jones & Laughlin Steel Corp. 151
*Joy Mfg. Co.
Insert between pp. 20-21, 39, 47, 189

*Kennametal, Inc. 117
Koehring Co. 18-19

*Laughlin Co., Thomas 183
LeRoi Co., Cleveland Rock Drill Div. 146
LeTourneau, Inc., R. G. 12-13
*Lee-Norse Co. 160
Lincoln Engrg. Co. 139
*Link-Belt Co. ..... Fourth Cover

Mack Trucks 129
Maximon Machine Co. 182
McGraw-Hill Book Co. 189
*Mine Safety Appliances Co. 137
Mine & Smelter Supply Co. 184
*Myers-Whaley Co. 36

Nachod & United States Signal Co 186
*National Malleable & Steel Castings Co. 53
*Nolan Co. 170
North British Locomotive Co., Ltd. 187

Ohio Brass Co. 119
*Oliver United Filters, Inc. 181
*Osmose Wood Preserving Co. of America 156

Paris Mfg. Co. 52
Pennsylvania Bearings, Inc. 121
Pennsylvania Drilling Co. 189

*Remaly Mfg. Co., Inc. 168
Ridge Equipment Co. 173
Robins Conveyor Div.,
Hewitt-Robins, Inc. 32-33
Roebling's Sons Co., John A. 169
*Rome Cable Co. 148-149
Rust-Oleum Corp. 163

*Salem Tool Co. 172
*Sanford-Day Iron Works 24-25
*Screen Equipment Co. 175
Searchlight Section 190-195
*Simplex Wire & Cable Co. 41
Sinclair Refining Co. 167
Spang Co. 168
*Sprague & Henwood, Inc. 176
Stamler Co., W. R. 178
Standard Oil Co. (Indiana) 125
Stoody Co. 55
Sun Oil Co. 134
Syntron Co. 174

Tennessee Bearings, Inc. 121
*Tennessee Coal, Iron & Railroad Co. 61
Texas Co. 6-7
*Thermoid Co. 130
Thurman Machine Co., Scale Div. 186
Tide Water Associated Oil Co. 51
*Timken Roller Bearing Co. 37
*Twin Disc Clutch Co. 164

United Engineers & Constructors, Inc. 143
United States Rubber Co. 155
*United States Steel Export Co. 61
Upson-Walton Co. 34

Victaulic Co. of America 120
Viking Machinery Sales Corp. 189
*Vulcan Iron Works 30

*Wedge-Wire Corp. 162
West Virginia Bearings, Inc. 121
Western Machinery Co. 27
Whitney Chain Co. 185
*Wickwire Spencer Steel Div.,
Colorado Fuel & Iron Corp. 26
*Willson Products, Inc. 164
*Wilmot Engrg. Co. 153
Winslow Scale Co. 185
Wyandotte Chemicals Corp. 185

Yardley Plastics Co. 62

PROFESSIONAL SERVICES 182-183

SEARCHLIGHT SECTION
(Classified Advertising)

EMPLOYMENT
Positions Vacant 190
Positions Wanted 190
Selling Opportunities Wanted 190
Employment Services 190

BUSINESS OPPORTUNITIES
Offered 190

NOTICES
Auction 190

PROPERTY
For Sale 190
Wanted 190

EQUIPMENT
Used or Surplus New 190-195
Rail 194

WANTED
Equipment 190
Miscellaneous 190

ADVERTISERS INDEX

Allison Engineering Company 190
Benney Equipment Co., R. H. 193
Bonded Scale & Machine Co. 192
Builders Steel Supply Co. 194
Carlyle Rubber Co., Inc. 193
Coal Mine Equipment Sales Co. 193
Duquesne Electric & Manuafcturing Co. 195
Electric Equipment Co. 192
Electric Service Co., Inc. 192
Fish & Co., J. T. 194
Florence Machinery & Supply Co. 194
Frank, M. K. 194
Gavenda Brothers, Inc. 191
Greensburg Machine Co. 194
Groves & Sons Co., S. J. 192
Hawkins & Co. 191
Industrial Equipment Corp. 192
Kaiser Steel Corp. 195
Kirk Steel Corp. 191
Kremser & Sons, Inc., Frank A. 191
Lefton Industrial Corp. 194
Locke Co., C. B. 192
Marion Power Shovel Co. 192
McCarthy Improvement Co. 195
Merrick Coal Co. 190
Midwest Steel Corp. 194
Mississippi Valley Equipment Co. 194
Moorhead Electrical Machinery Co. 195
Morse Bros., Machinery Co. 193
Orchard Coal Company 190
Pierce Equipment Sales Co., Roger 190, 192
Ross & Ross 190
Shaner, K. O. 190
Simpson, T. L. 194
Snap Creek Coal Co., The 195
Tomsett Associates 190
Wenzel Machinery Rental & Sales Co. 194

* Indicates that detailed information may be found in the 1950-51 MINING CATALOGS.

This index is published as a convenience to the reader. Every care is taken to make it accurate, but C. A. assumes no responsibility for errors or omissions.

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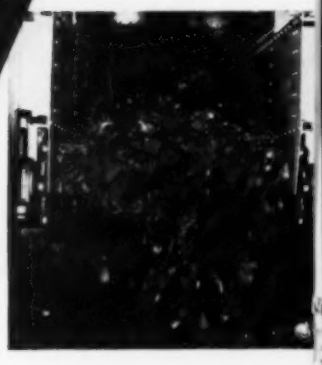
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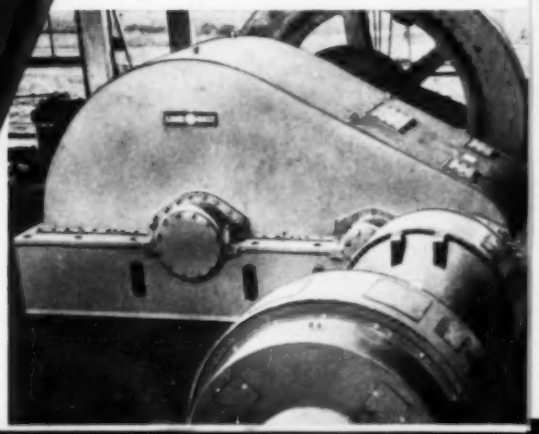
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12.578

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